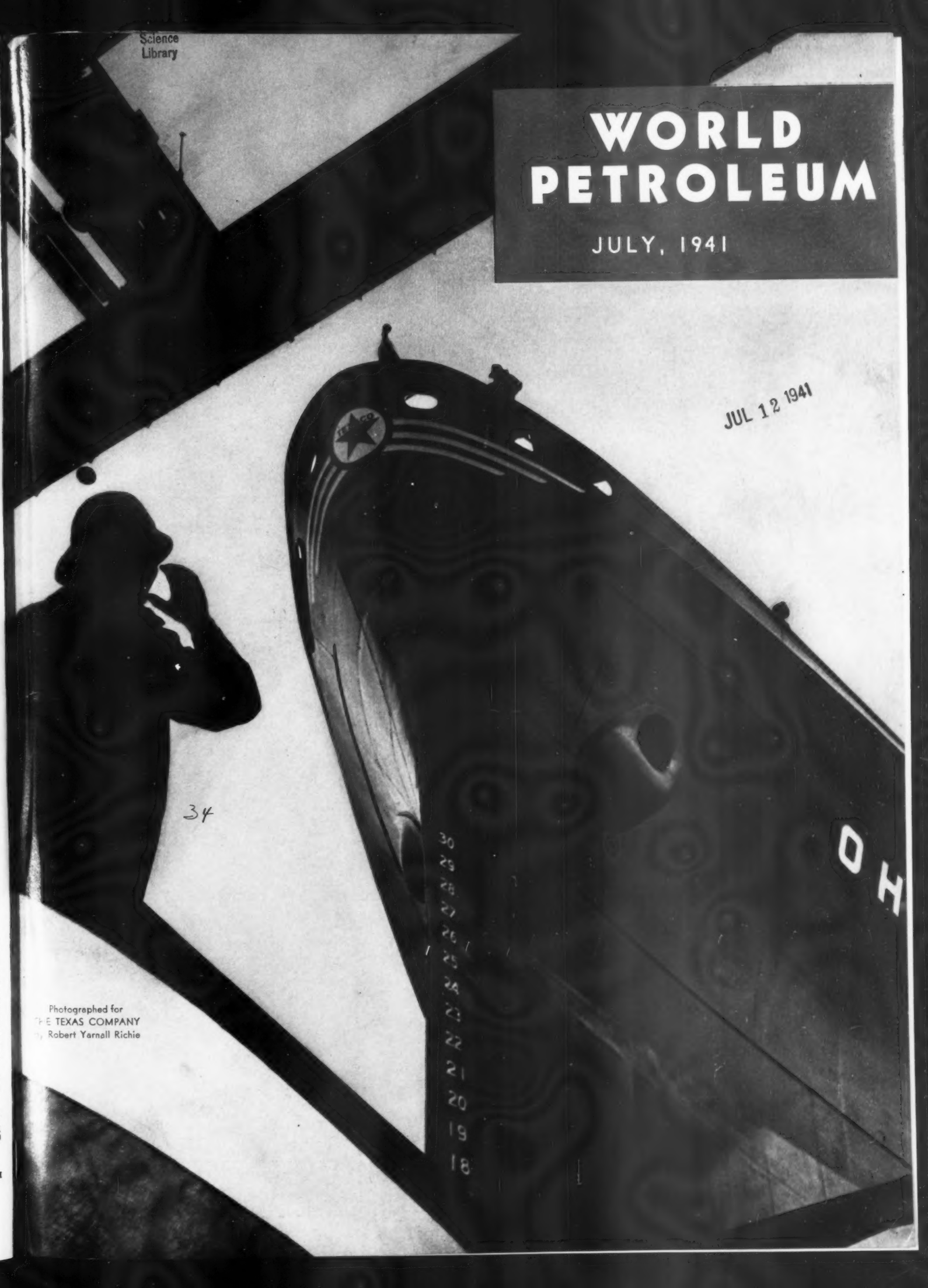
Science
Library

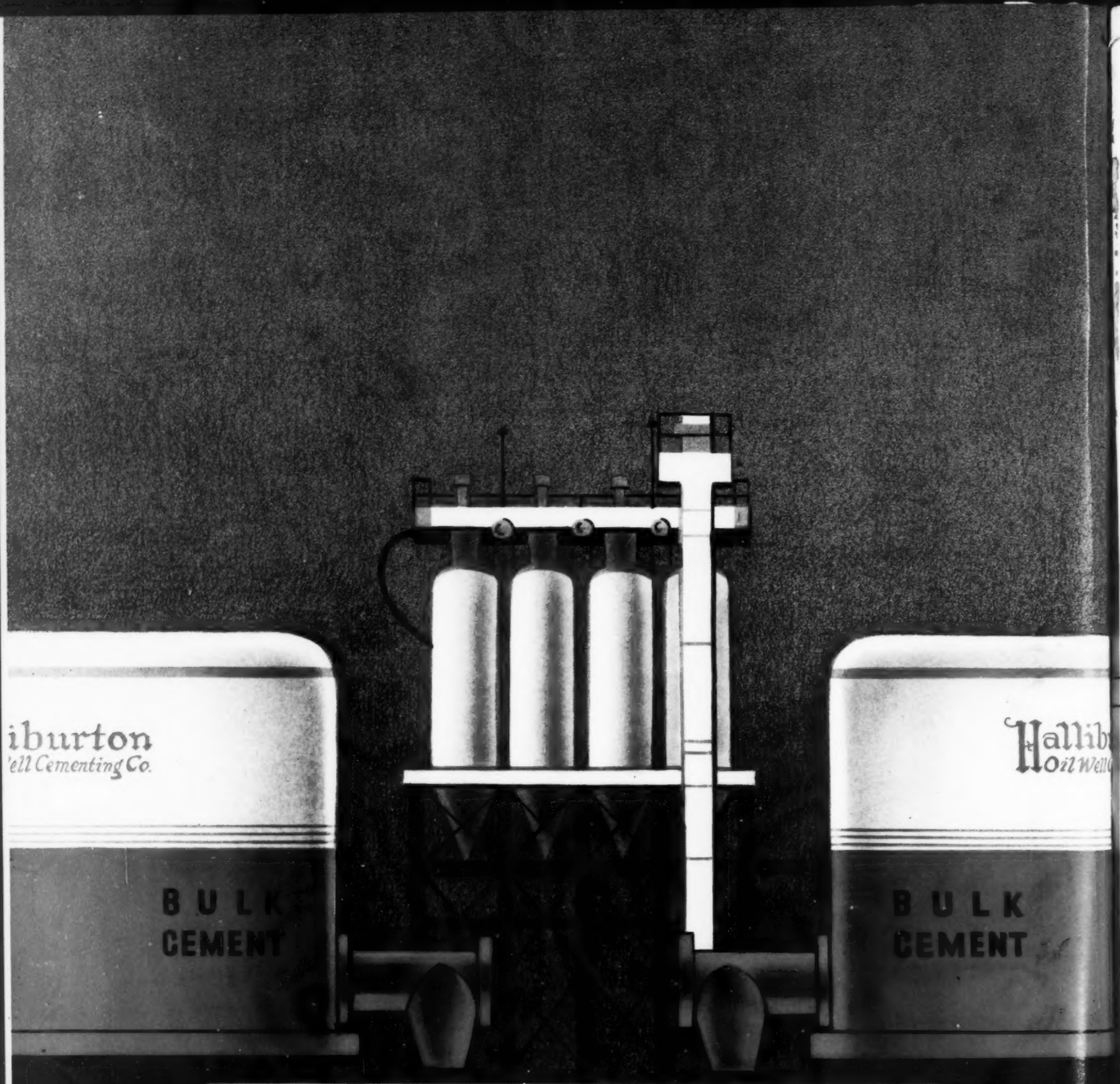
WORLD PETROLEUM

JULY, 1941

JUL 12 1941



Photographed for
THE TEXAS COMPANY
by Robert Yarnall Richie



"A STEADY STREAM IN • AND A STEADY STREAM OUT"

HOWCO BULK CEMENTING

Introduces a new element of precision by eliminating the error due to waste which occurs when cement is handled in sacks . . . Does away with mess, waste, breakage and spoilage . . . a sack becomes a sack! . . . Another step in Howco's program of TAKING THE GUESSWORK OUT OF OIL WELL CEMENTING.

HALLIBURTON OIL WELL CEMENTING COMPANY

WORLD PETROLEUM

Founded by Russell Palmer

Rex W. Wadman
General Manager

E. W. Mayo
Editor

E. W. Mayo, Jr.
Managing Editor

S. J. Gallay
Advertising Manager

VOLUME 12 **JULY, 1941** **NUMBER 7**

WORLD PETROLEUM: Incorporating Petroleum Equipment Exporter

CORRESPONDENCE

PUBLISHED monthly by the estate of Russell Palmer, 1309 Noble Street, Philadelphia, Pa. Address all correspondence regarding editorial and advertising matters to 2 West 45th Street, New York, N. Y. Telephone Murray Hill 2-7333.

London office; Brettenham House, Lancaster Place, W.C.2.

Los Angeles office; 412 West 6th Street

▼

SUBSCRIPTIONS

ANNUAL subscription to WORLD PETROLEUM is offered at the flat rate of five dollars (U. S.) postpaid to any country in the International Postal Union.

For the convenience of subscribers publisher will accept payment in any of the following currencies at the fixed rate shown below:

Argentina	4.17 paper pesos
Brazil	58 paper milreis
Canada	5.00 dollars
Colombia	5.00 pesos
Great Britain	1 guinea
India	15 rupee
Iran	1 guinea
Iraq	1 guinea
Japan	20 yen
Mexico	14 pesos
Peru	6 sol
Venezuela	11 bolivar

Remittances or drafts should be drawn to the order of the Publisher, WORLD PETROLEUM, payable in New York and London.

Subscriber's name and address should be in Roman capitals on the subscription order.

Official position of subscriber is requested.

Advance notice, if possible of a change of subscriber's address should be given.

CONTENTS

World's Greatest Tanker Fleet	23
Pipelines to Relieve East Coast Shortage	28
U. S. Oil Industry Organizes	32
16% Increase in Oil Earnings	35
Oil & Axis Strategy	39
World Crude Production	44
Death of Lord Cadman	46
Foreign Oil Legion	48
N. Y. Nomads Golf Tournement	52
Abstracts	54

AGENCIES

SINGLE copies of WORLD PETROLEUM are obtainable every month, within the delay imposed by the international mail service, at any of the following agencies:

MARACAIBO, VENEZUELA—High Life Tailors.
LONDON — World Petroleum, Brettenham House Lancaster, Place, W. C. 2.
A. C. Hardy, 110 Fenchurch St. E. C. 3
W. H. Smith & Sons, Ltd., Moorgate Met. Station
Willing & Co., Ltd., Moorgate Met Station
Barker & Howard, 6 Fenchurch Buildings, E. C. 3
NEW YORK—Telephone Murray Hill 2-7333 for list of 20 newsstands carrying copies
PORT OF SPAIN, TRINIDAD — Davidson & Todd, Ltd., 8 Frederick St.
LOS ANGELES—412 West 6th St., telephone: Mutual 1391.

British subscribers may make payments at the London office of World Petroleum. Monthly copies, two shillings; yearly, one guinea.

▼

PARTICULAR NOTICES

MANUSCRIPTS and photographs submitted to the editor are received only at the owner's risk. Prompt consideration will be given to them.

The publisher does not necessarily endorse the views expressed by authors of signed articles. In the service of readers he will not hesitate to give publication to signed opinions in direct opposition to his own.

Advertising rates obtainable on request.

▼

COPYRIGHT

COPYRIGHT, 1941, by the estate of Russell Palmer. Contents may not be reproduced without permission.

Petroleum transportation from West to East promises to occupy a large place in the industry's planning for the future. Photograph by Ulric Meisel.

EDITORIAL

OIL'S PART IN THE WAR'S NEWEST PHASE

Nazi Germany's sudden move against the Soviet Union opens a new chapter in the story of the part played by oil in the present European war. Germany may or may not be facing an early shortage in food and fuel but there is no question that if the struggle now under way is to be a prolonged one she will have need of both in greater quantity. It is a fair assumption that the Fuehrer would not have embarked upon such an adventure which, even though it be entirely successful, will put a heavy strain upon his war machine and will add vastly to the responsibilities he already has assumed for ordering the destiny of a whole continent without compelling reasons.

As pointed out in a carefully studied article appearing elsewhere in this issue the German position today in respect both of oil and food differs greatly from any situation that could have been anticipated before 1939. The Nazi organization has spread its operations and its authority over more than a dozen countries extending from the North Cape to the Mediterranean. By so doing it has acquired not only the task of supplying its own forces over this broad area but it also has taken on the responsibility of providing the means of keeping the subjugated peoples of these countries alive and their industries in operation. No matter how severely they may be rationed certain meagre necessities must be supplied if they are to contribute to Germany's military and industrial needs as contemplated by the Nazi program. While there is abundant evidence that the oil problem was carefully studied by German economists and strategists in the pre-war period and that definite plans were prepared to meet the conditions that would follow the outbreak of hostilities they did not extend to the present situation. These preparations would have sufficed for a brief struggle or for a longer campaign if Germany stood alone or if her sphere of operations were still confined to Central Europe. They are not adequate for a long contest encompassing a vastly broadened area. The gains which Germany made during the first months of the war forced her leaders to assure themselves of additional supplies of oil by seizing control of Rumania and led to the whole series of Balkan operations. Even with all that Rumania can give, Germany is not in a position to wage the prolonged struggle that looms with growing British strength backed by the full resources of America. A richer granary and a larger supply of oil became necessary to meet this situation.

Viewed from this angle the Russian campaign, large undertaking though it is, must be viewed as part of a still larger plan envisioned by the Nazi leadership. Even though the drive through Soviet territory proceeds "according to plan" and control of Baku and Batum passes to Hitler's hands at an early date the physical possession of the Soviet's main oil fields will not provide a full solution of Germany's oil difficulties. The problem of transportation will remain. That problem will not be solved so long as the British fleet rules the Eastern Mediterranean. Facilities for overland transportation of Russian and Rumanian oil in sufficient quantity do not exist and cannot be quickly provided. It is reasonable to believe, therefore, that a swift triumph over the Soviets figures in Nazi strategy as a prelude to a further drive to capture Suez, eliminate British naval vessels from the Mediterranean and thus make available to Axis powers water routes now closed to them. Then it would be possible to move oil and other products by ship from the Black Sea area to Trieste and other Italian ports, possibly through French Mediterranean

ports, and to take advantage of transport facilities from these points to all parts of Europe under Nazi domination. Under such circumstances Hitler need worry little about the blockade of Atlantic ports or about the provision of oil, food and other necessities for a long contest. It is a bold dream and one that may not be realized but it is not too daring for the man whose military machine has overrun Europe during the past two years according to schedules laid down with the exactness of a railway time table. On any other hypothesis it is difficult to explain the attack on Russia in view of the fact that most of the products that Russia can supply could have been obtained without fighting.

MEETING THE OIL EMERGENCY

Oil supply to Britain has become a hemispheric problem. It assumed that aspect when the theatre of war moved to the Mediterranean and the length of time required for the long voyage from the Near and Far East around the Cape of Good Hope became too great to be covered by available tanker tonnage. From that time on it became necessary for the British government to look to North and South America for the fuel and lubricants to operate its war machine. More recently conditions have come into existence which led to a call for American tankers to aid in the shipment of these products in order to keep the supply moving eastward across the Atlantic in adequate volume. Responding to this appeal fifty United States vessels were detached from the coastwise trade and assigned to a so-called shuttle service moving oil from the Caribbean to North Atlantic ports for transfer to British owned or chartered tankers for the trans-Atlantic voyage. This system appears to be meeting the immediate demand for which it was established but it has obvious limitations such as are imposed by the transfer of cargoes and inability to utilize vessels always in the service for which they are best adapted. Due to the somewhat anomalous position of the United States in not being an active participant in the war though committed to extending the greatest possible degree of assistance to the defenders of democracy certain lines of action are closed to it. Under the neutrality law, for example, it is not possible for ships under the United States flag to enter the war zone which includes the waters surrounding Great Britain, nor has it been attempted to provide naval protection for shipping outside the prescribed area. Subsequent developments may bring about a change in policy but even without such change it should be possible, and certainly it would be desirable, to put the movement of oil from the Western Hemisphere to Britain on a thoroughly efficient basis.

Looked at from the viewpoint of practical operation it is clear that petroleum products for military use should be drawn from the most convenient points and moved to their destination in the most rapid manner consistent with the highest attainable degree of safety. If this involves the exchange of products between refining companies why should this not be done? If the pooling of tanker tonnage now employed in the Western Hemisphere regardless of flag will permit more rapid movement of oil to the United Kingdom or to the east coast of the United States that is a highly desirable result. In general the routing of oil within the United States so as to keep it moving steadily from west to east by whatever means of transport may be employed and the assignment of oil from the Caribbean to areas where it may be used to greater advantage either for overseas shipment or for the needs of American industry would seem to be an obvious measure and one that could be put into effect without intereference with the neutrality law or changing the policy heretofore followed by the government of the United States. It would involve concerted action on the part of American oil companies which now is permissible if approved by the Petroleum Coordinator and the Department of Justice and it presupposes close collaboration between representatives of American industry and of the British government.

Such a consolidation of effort should serve not only to speed the movement of needed war supplies across the Atlantic but should be helpful also in meeting the situation in the eastern United States created by the diversion of tankers to the war supply service. By united effort and sound direction it should be possible to meet all essential needs of all sections of the country without resort to the drastic measures of curtailment that have been highlighted in newspaper headlines as being imminent.

It would be rash to predict what course this surprising war may take or to what extent it may become necessary in future to curtail ordinary uses of liquid fuel in order to sustain an expanding war effort. On the facts that exist today, however, there is no reason to assume that rationing of the private use of gasoline will be necessary in the United States or that adequate heating of houses warmed by oil burners will be impossible during the coming winter. By joint effort of the industry and the authorities, together with the voluntary cooperation of consumers, it will be feasible to meet all necessary domestic requirements and at the same time to extend all needed aid to Britain.

World's Greatest Tanker Fleet Building For United States

Construction Being Rushed to Replace Ships Serving War Effort, to Meet Heavy Demand, and Provide Needed Capacity from Gulf to Atlantic Seaboard.

In the depression year of 1933 more than 26 percent of the world's tanker tonnage stood idle on July 1. Of the 4,000,000 dead weight tons of American vessels for the oil carrying trade 1,000,000 tons were tied up while of the remaining 9,000,000 tons of vessels in the international tanker fleet roundly 2,300,000 tons were unemployed. As a corollary of this unsatisfactory situation and the consequent low charter rates prevailing, new construction had fallen to the lowest point it had reached in many years with only 350,000 tons on the ways. Not until 1936 had business recovered to the extent that as of July 1, only 10 percent of the world fleet was idle and new construction reached the more normal figure of 1,500,000 tons. Of American flag tankers only four percent was out of commission at the beginning of that year and this percentage steadily decreased until 1938 when the building of additional tonnage began to make itself felt. In 1937 a new chapter began to be written in the development of the United States tanker fleet. This was brought about largely through the efforts of the U. S. Maritime Commission working in conjunction with the U. S. Navy in an effort to provide a type of vessel suited to the needs of an expanding naval establishment. At that time, the average age of American oil carrying ships was upward of fifteen years and their average speed was from ten to twelve knots. These old and slow boats satisfied ordinary commercial requirements but it was realized that they would be inadequate to meet the needs of naval squadrons in active service.

Accordingly the Maritime Commission entered into a contract with the Standard Oil Company of New Jersey by which the latter undertook to build twelve large tankers capable of making sixteen knots or better. These vessels were subject to call by the Navy as needed. In consideration of the fact that the higher speeds provided were uneconomic for regular commercial traffic and because of special features embodied in their construction to fit them for naval use, the Maritime Commission provided funds to meet the extra cost of building and operation. Subsequent contracts with other companies provided for 11 additional tankers of somewhat similar design which are now known as National Defense type tankers.

At the time these ships were ordered it was generally assumed that they would be operated for several years at least by the oil company owners, but later developments caused five of the original twelve to be taken over by the Navy before they were fully completed while the remaining seven were requisitioned after a brief period of commercial service for the oil companies.

Meanwhile, the growth of the international oil trade had given renewed impetus to tanker building in Europe. Between 1934 and 1939 roundly 4,000,000 dw. tons were added to the world's tanker supply. Building activity was such that unemployed shipping, which declined to little over 250,000 dw. at the close of 1937, had risen to more than 1,500,000 dw. tons by July 1, 1939.

At that date, just before the start of the European war, the number of tankers afloat was around 1,800 with a dead weight tonnage of over 17,000,000 tons of which approximately one quarter was of American registry. A heavy building program during 1938 had widened the rather narrow margin between supply and demand that existed at the end of 1937. There was a growing surplus of cargo space and freight rates were low but 90 percent of the tonnage was in active service.

The brief sketch of conditions preceding the war supplies a background for the changes that followed immediately afterward. First of all, the British blockade caused German ships to cling to the protection of home ports or to seek neutral harbors if they happened to be abroad on the outbreak of hostilities. Since ocean borne cargoes no longer could move to Germany, this did not greatly alter the situation. Expectation of a sharply accelerated movement of oil to neutral European nations and to Great Britain and France together with Great Britain's charter of approximately one quarter of Norway's fleet and the extended delays in operation under convoy, created a considerable shortage of tonnage available for charter in Western Hemisphere trades and was a prime cause for the steady advance in market rates through May 1940. The loss of markets resulting from the invasion of the Low Countries and the collapse of France brought about a sharp decline in freight rates by July which continued through August.

Anticipating the need of additional vessels under foreign flags to handle export movements, a number of American tankers were transferred to other flags. Up to June 18, 1941 these transfers included 39 vessels of which 28 were placed under the Panama flag while the others were transferred to British, Brazilian, Peruvian and Venezuelan registry. Withdrawal of these vessels aggregating almost 390,000 dw. tons temporarily reduced the size of the American tanker fleet but by easing the world tonnage situation avoided withdrawal of an equivalent amount of foreign tonnage servicing U. S. import requirements.

Extension of German authority over most of western Europe, together with the active participation of Italy in the war, radically affected the international tanker situation. It shut off most of the continent from access by ocean routes and immobilized a considerable number of ships formerly plying to European ports. It deflected shipments moving from the Near East to Britain from the Mediterranean route to the much longer course around the Cape of Good Hope. It enabled the British, however, to gain control of a large amount of allied tonnage.

To reduce the time required for individual voyages the movement from the Near East around the southern tip of Africa to Britain's Atlantic ports was gradually contracted and in 1941 the Caribbean has become the main source of petroleum supply for Great Britain. Despite this saving in distance the necessity of moving ships across the Atlantic under convoy, including time consumed in assembling convoys, the slow rate of travel of vessels moving in groups and delays in discharging cargo lengthened the time required for each round trip to at least twice the average time required under normal conditions, thereby reducing the efficiency of the fleet by fully one-half. The handicap imposed

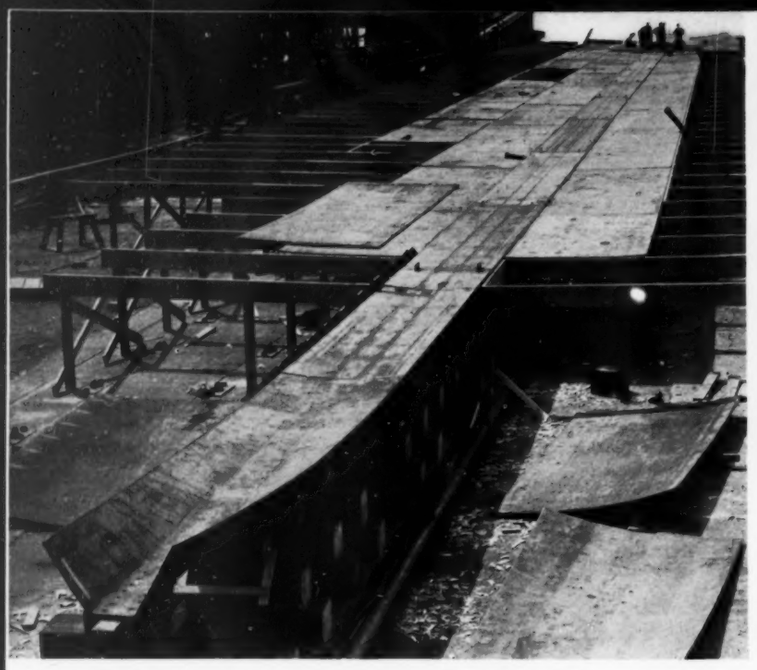
TABLE I

World's Tanker Tonnage in Operation, Tied-Up and Under Construction

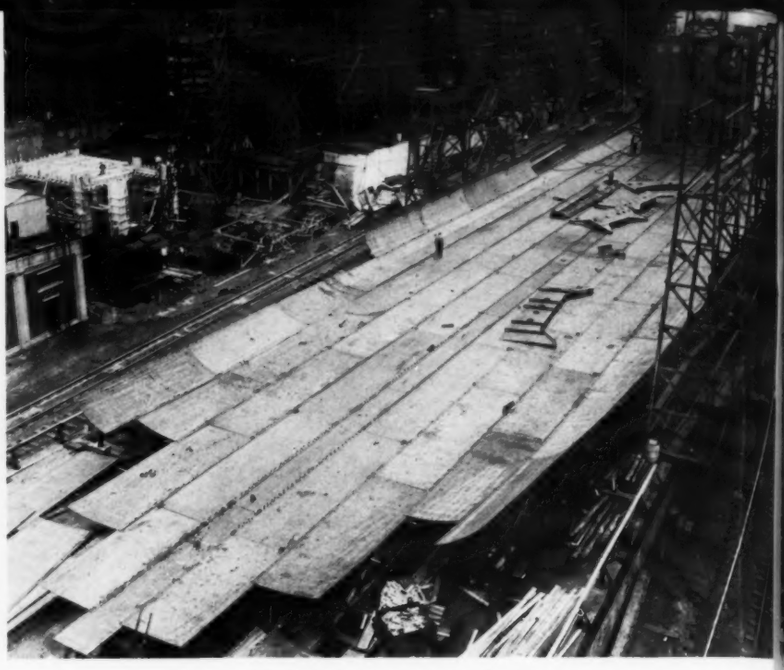
July 1, 1931 to July 1, 1939

Dead Weight Tons

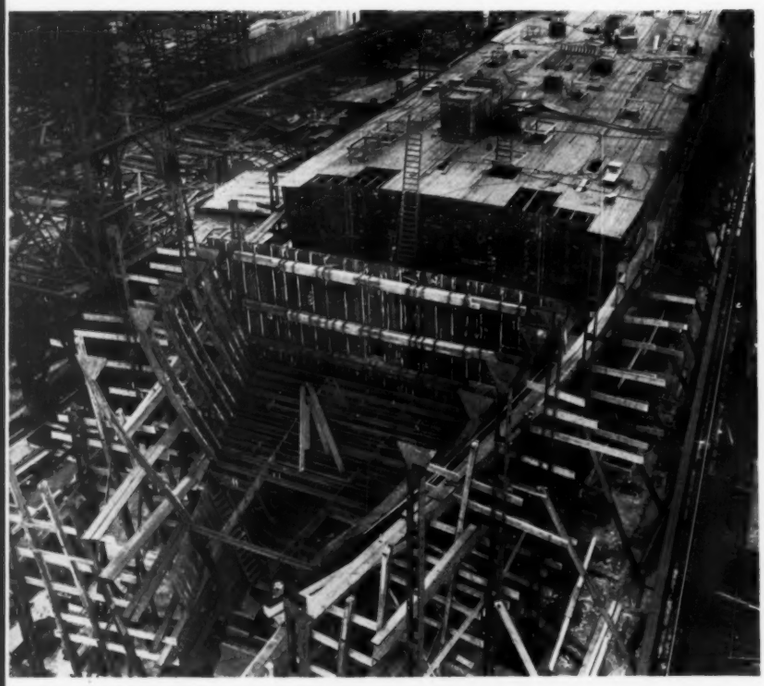
	United States		Foreign		World			
Date	In Operation	Tied-Up	In Operation	Tied-Up	In Operation	Tied-Up	Total	Under Construction
July 1, 1931	3,158,654	840,288	6,240,084	2,194,992	9,398,738	3,035,280	12,434,018	1,204,760
July 1, 1932	3,250,296	903,744	6,462,056	2,557,564	9,712,352	3,461,308	13,173,660	632,420
July 1, 1933	3,057,792	1,067,616	6,820,464	2,286,576	9,878,256	3,354,192	13,232,448	333,250
July 1, 1934	3,658,020	457,944	7,530,744	1,704,456	11,188,764	2,162,400	13,351,164	687,720
July 1, 1935	3,773,964	333,096	7,888,245	1,656,867	11,662,209	1,989,963	13,652,172	655,720
July 1, 1936	4,627,764	49,932	8,787,204	1,060,572	12,814,968	1,110,504	13,925,472	1,332,420
July 1, 1937	4,131,146	29,338	10,487,314	203,823	14,618,460	233,161	14,851,621	2,258,678
July 1, 1938	4,154,798	234,371	10,508,929	1,029,180	14,663,727	1,263,551	15,927,278	2,565,854
July 1, 1939	4,346,593	206,307	11,360,615	1,402,412	15,707,208	1,608,719	17,315,927	1,733,150



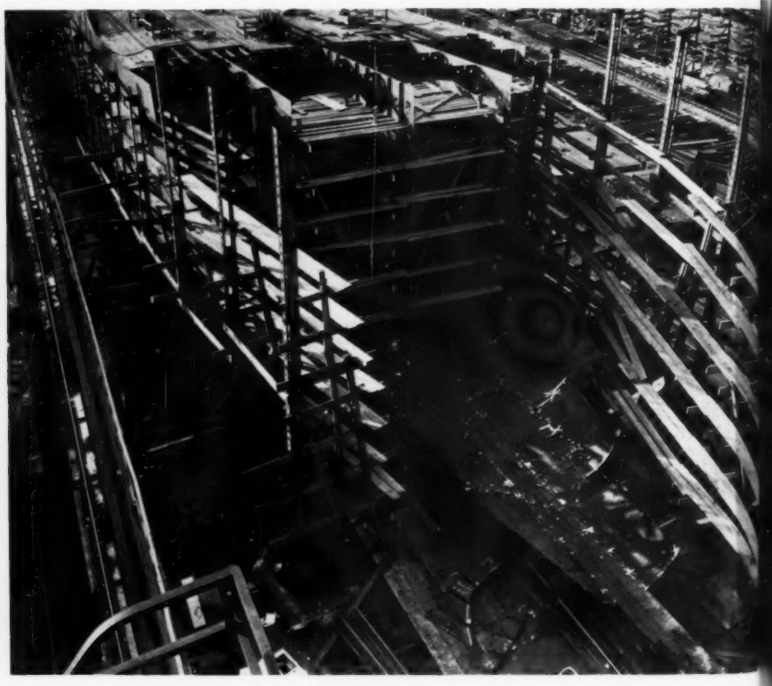
1. Steps in construction of a defense type Socony-Vacuum tanker: Laying the keel on July 11, 1940.



2. Bottom shell plating and first bulkhead is erected by August 14, 1940.



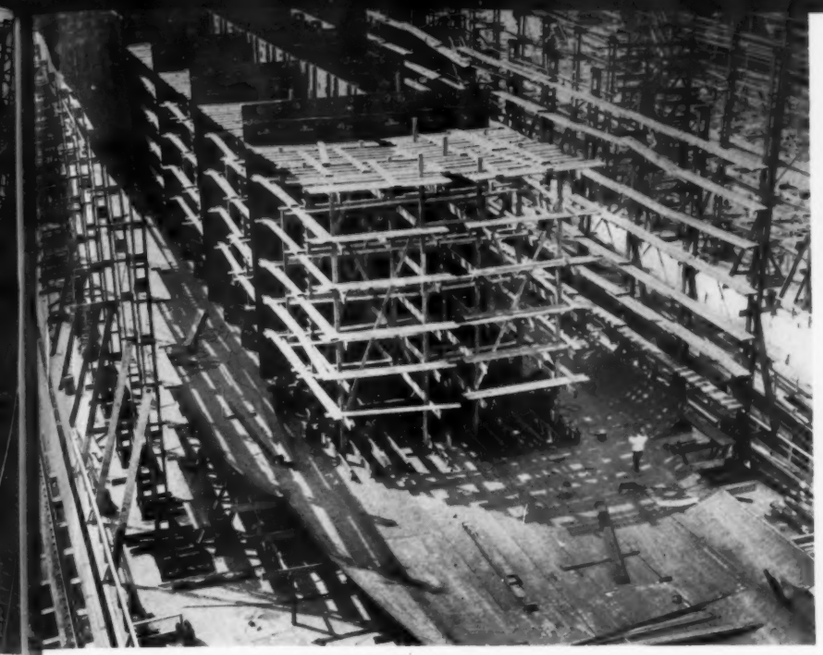
5. Deck plates are laid and framing in way of machinery space is erected by November 19, 1940.



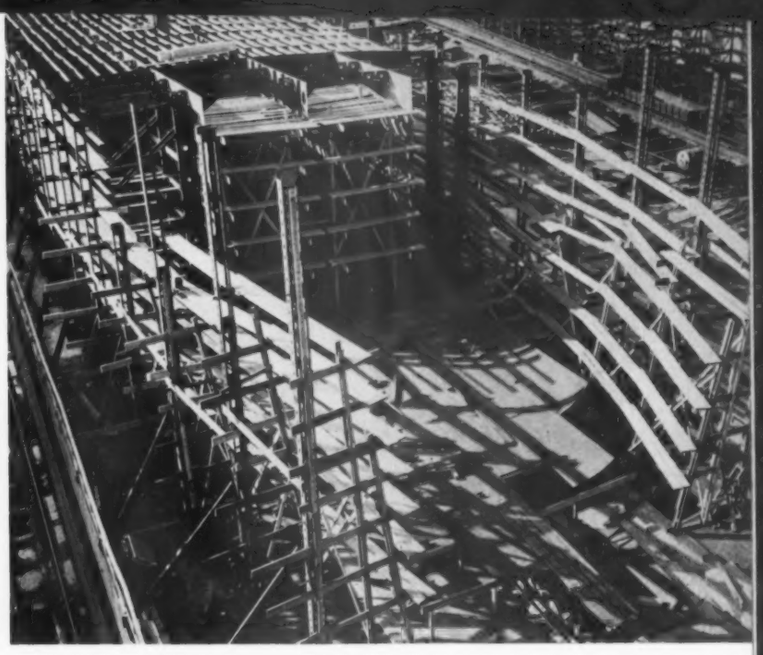
6. By December 17, 1940 bottom plating at bow is ready for welding.

by these conditions, added to serious losses by sinkings, led the British, some two months ago, to ask the assistance of the United States. This request brought an immediate call from the President for the assignment of fifty American tankers to the service of shuttling oil to more convenient points in the Atlantic seaboard for transfer to British vessels.

This demand came without forewarning and raised a problem of serious proportions for the oil industry of the United States and more particularly for that portion of it operating between the Gulf Coast and the Eastern states. Of the American coastwise fleet nearly three-quarters was engaged in traffic between Gulf and Atlantic ports. Consequently, the greater part of the vessels assigned to the service of supplies for Britain had to be withdrawn from these routes. Loss of this capacity came at a time when the growth of industrial activity under the influence of developing defense program was being reflected in an increasing demand for petroleum products from the great manufacturing districts of the Eastern states. For the first quarter of 1941 the domestic demand for all petroleum products averaged 3,858,000 bbl. daily, an increase of 8.3 percent over the corresponding period of 1940. While the export movement had declined 36 percent, total demand was still 4.4 percent higher than in the year preceding. Taking the country as a whole much the greater volume of oil is moved by pipeline but in the supply of the Atlantic Seaboard well over 90 percent is transported by tanker. Since the daily movement had risen to roundly 1,500,000 bbl. a reduction of even ten percent in tanker capacity raised the possibility of a shortage in supplies along the Atlantic seaboard unless other means of transport could be provided. Various plans for filling this gap have been proposed. The most significant appears to be the construction of additional pipelines but this of course requires several months and the possibility that the shortage cannot be avoided in time by this means has led to the considera-

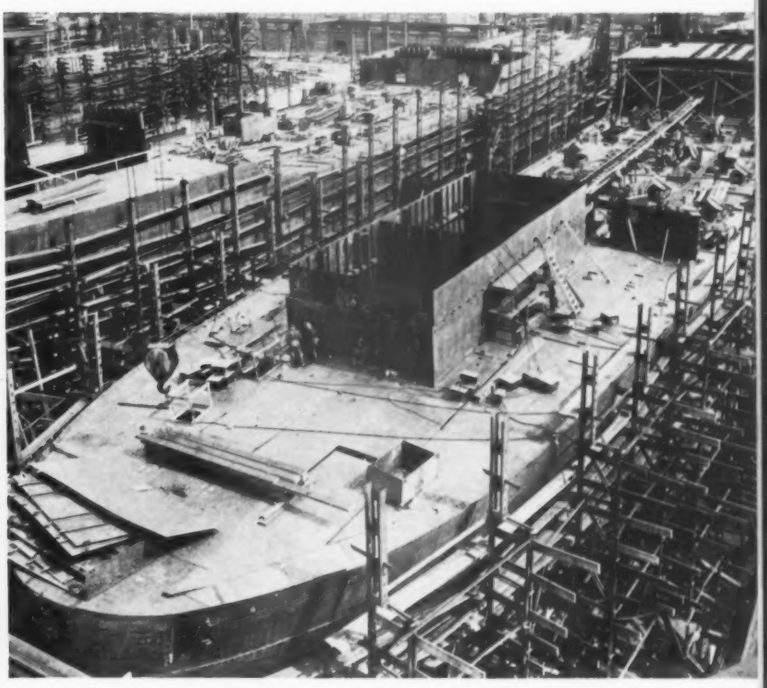


3. September 13, 1940: erecting cargo tank bulkheads.



4. Side plating and deck longitudinals erected in way of cargo space—October 15, 1940.

7. Deck erection starts on January 20, 1941.



8. March 12, 1941: hull practically completed, forecastle and midship house are progressing.

tion of steps to reduce the consumption of petroleum products during the emergency period.

At the present time, the most extensive tanker building program in the history of the industry is under way in the shipyards of the United States. Deliveries scheduled for the remainder of the year will bring the total number of American flag tankers, exclusive of those ordered for the navy, up to 405 or near the same figure (409) as on June 30, 1939, thus offsetting in numbers the transfers to other flags and the requisitionings by the Navy Department, but with over 100,000 tons more carrying capacity and materially higher speed. Table IV accompanying shows the changes taking place in the American tanker fleet from June 30, 1939, to Dec. 31, 1941.

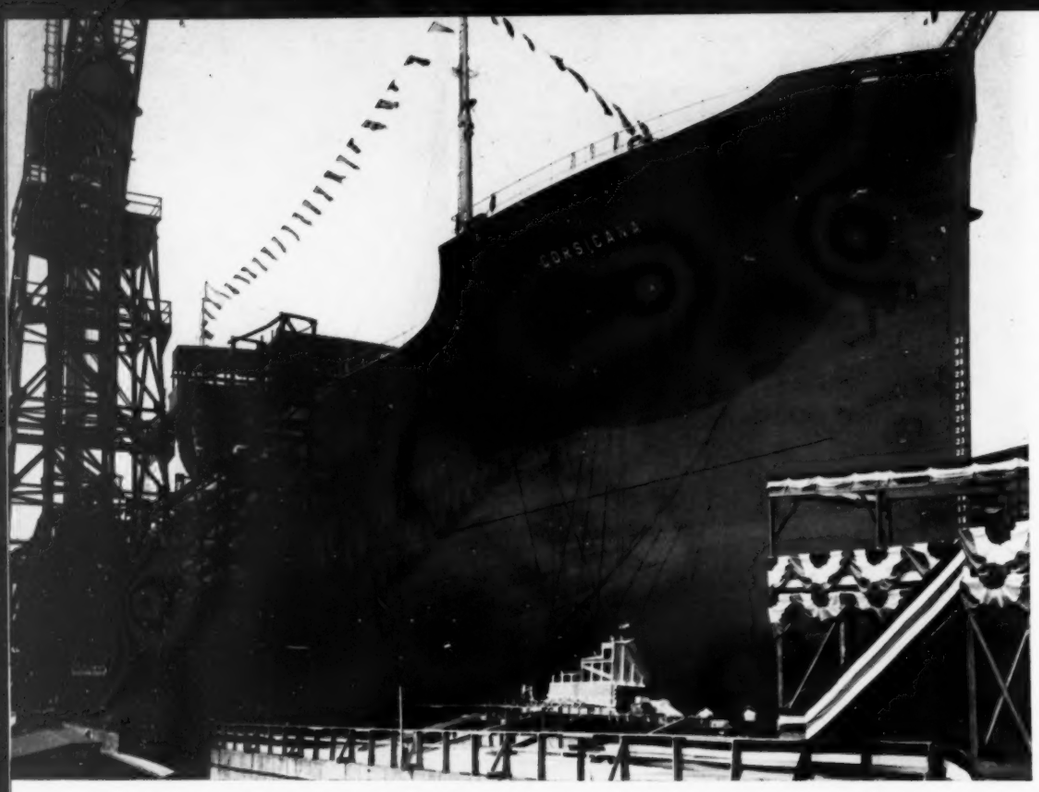
TABLE II

U. S. Flag Tanker Tonnage

(June, 1939)

		Deadweight Tonnage
Domestic Trade:		
Coastal	3,385,246	
Intercoastal	204,916	
Miscellaneous	291,214	3,881,376
Foreign Trade		465,217
Total in Operation		4,346,593
Tied Up		206,307
Total Afloat		4,552,900
Under Construction		193,150

As of January 1, 1941 the number of American flag tankers, exclusive of those in naval service and exclusive of 68,999 dw. tons represented by 18 Great Lakes barges, was 373 with a deadweight tonnage of 4,102,193. Of this fleet, vessels aggregating 87,000 dw. tons do not have coastwise privileges. Seven tankers, approximately 117,000 dw. tons, were completed between January 1 and June 18 this year. On June 18 the number of tankers under construction or on order for private companies was 71,



Ready for launching at Sparrows Pt., Md. on April 19 the tanker was named "SS. Corsicana." N. J. Playmert, Naval Architect of Socony-Vacuum, was responsible for the unique design.

including four for Petroleum Shipping Company which will operate under the Panamanian flag, and five for the U. S. Maritime Commission. Under the head of emergency construction, the Maritime Commission has placed orders for 72 additional tankers of approximately 1,100,000 dw. tons. Excluding the Maritime Commission vessels, deadweight tonnage on order for commercial operation amounts to 1,091,060. Completion of these orders, therefore, will add over 25 percent to the commercial tanker tonnage of the United States as of June 18, exclusive of tankers building for the Maritime Commission. A further addition to the tanker fleet is contemplated by the proposal recently put forward for the organization by oil companies themselves of a shipbuilding company to undertake the building of 36 or more fast tankers per year of large capacity. This project is only in its initial stage as yet and no details have been decided upon.

Once this huge array of new ships is afloat, the United States will have the greatest and most efficient tanker fleet in the world. The task of bringing this fleet into being is so great, however, and the demands for other shipbuilding are so extensive that even with all possible expansion of building facilities construction of the last of the tankers on order cannot be completed until late in 1943. Meanwhile, the immediate efforts of tanker operators are directed to getting the highest possible degree of performance from the vessels now available.

A great deal in this direction is being accomplished through steps already taken. These include the reconditioning of ships which normally would be retired from service because of the higher operating costs of these older vessels. New ship and shore equipment has been installed to speed up the turn-around of vessels in order to increase their effective carrying capacity. Additional storage is being installed at terminals which in future could be filled during the slack season to be drawn upon in periods of heavy consumption. Other measures to conserve tanker tonnage which can be put into operation if the oil companies are permitted to act in concert will include the exchange of products to eliminate cross hauls and back hauling and the combination of facilities to supply plants and marketing areas now served separately. Surveys are being made to determine what additional transportation capacity can be furnished by rail tank cars. Further moves that have been suggested to relieve the situation are the lightening of load line requirements for the period of the emergency and the more extensive use of barges in coastal, lake and river transportation. Some of the oil companies have placed orders for numbers of barges which can be constructed in much less time than is required for tankers of equal capacity. Twenty-four oil barges of approximately 12,000 gross tons were listed as being under construction on May 1.

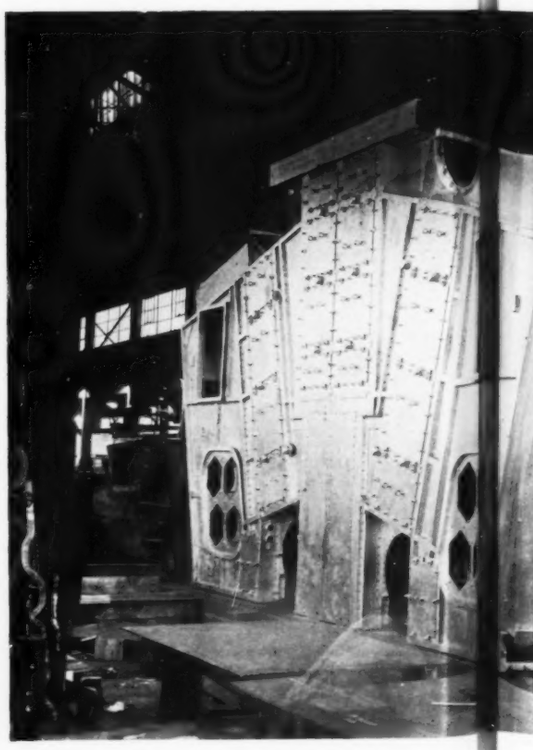
A review of the world tanker tonnage situation during recent years shows that, during the 1930's—up to the time of the outbreak of the war—there was, for the most part a sizeable surplus of tanker tonnage in the U. S. and for the world as a whole, with a resultant low rate of construction until the last few years. The most significant U. S. tanker tonnage construction toward the end of this period was that of the Defense Feature Type tankers constructed

TABLE III

Tankers Transferred from U. S. to Foreign Registry

September 3, 1939 to June 18, 1941

Vessel	Year Built	D.W.T.	Transferred to
Amsco	1920	6,500	British
Beaconhill	1919	11,030	Panamanian
Beaconlight	1920	10,720	"
Beaconoil	1919	10,670	Panamanian
C. J. Barkdull	1917	11,175	Venezuelan
Captain A. F. Lucas	1904	5,882	Panamanian
Charles Pratt	1916	15,955	"
Coalinga	1910	1,335	Peruvian
Frango	1917	8,248	Panamanian
Dean Emery	1919	11,310	"
Elisha Walker	1920	11,365	"
George G. Henry	1917	10,840	"
Geo. H. Jones	1918	11,205	"
H. H. Rogers	1916	15,955	"
H. M. Flagler	1918	12,430	"
H. C. Folger	1916	11,060	Brazilian
I. C. White	1920	11,365	Panamanian
J. E. O'Neil	1918	10,850	Brazilian
James McGee	1917	16,080	Panamanian
Joseph Seep	1920	11,120	"
La Brea	1916	10,676	British
Louisiana	1901	3,960	Panamanian
Norman Bridge	1913	6,875	Venezuelan
Royal Arrow	1916	13,425	Panamanian
Ruth Kellogg	1920	8,125	British
Santa Maria	1922	12,957	Panamanian
Standard	1914	18,075	"
Sylvan Arrow	1918	13,358	"
T. J. Williams	1921	12,555	"
Transford II	1920	2,000	British
W. C. Teagle	1917	16,080	Panamanian
W. H. Libby	1921	12,495	"
Warwick	1920	6,346	Brazilian
T. J. Conway	1930	800	Peruvian
Algonquin	1920	10,810	Panamanian
Yorbalinda	1921	10,760	"
Bacoi	1912	2,300	"
New York	1916	9,830	"
Olympic	1907	8,340	"
		394,862	



One difficult problem of design was to obtain the horsepower necessary for a national defense type tanker on one screw only and in the limited space available in the boiler room. Foster Wheeler built the boiler casing with sloping sides to conform to the hull shape.

by private companies in conjunction with the U. S. Navy and subsequently requisitioned by the latter. With the outbreak of the war, the world tanker tonnage situation became comparatively tight due to convoy delays and sinkings. This condition continued until the fall of France, at which time the elimination of deliveries to continental Europe resulted in a temporary surplus of tonnage in world markets. This surplus was soon removed as the result of additional sinkings and convoy delays, with the eventual result that the British were forced to request aid from the U. S. which was furnished in the form of 50 American tankers which have recently been transferred to the service of shuttling oil to the U. S. Atlantic seaboard for British requirements. This transfer of tankers to British service comes at a time when an extensive tanker-building program was already under way in the U. S., but with considerable time still required to complete this construction program. With the current marked increase in the U. S. petroleum requirements, the threat of a temporary shortage, as a result of limitations in transportation facilities which would reach its critical point during the coming winter, has resulted in a number of steps already taken or under development for increasing tanker capacity and for the substitution of alternate transportation methods in the form of pipelines, barges, and railroad tank cars.

TABLE IV

Carrying Capacities

	Building (Deliveries since Jan. 1, 1939)		Total (Incl. Old Type)	
	No.	D.W.T.	No.	D.W.T.
June 30, 1939	6	100,802	409	4,341,904
Dec. 31, 1939	8	138,507	393	4,171,389
June 30, 1940	12	202,272	389	4,168,202
Dec. 31, 1940	18	282,072	391	4,171,192
June 30, 1941	26	413,221	394	4,240,153
Dec. 31, 1941	37	578,126	405	4,404,403

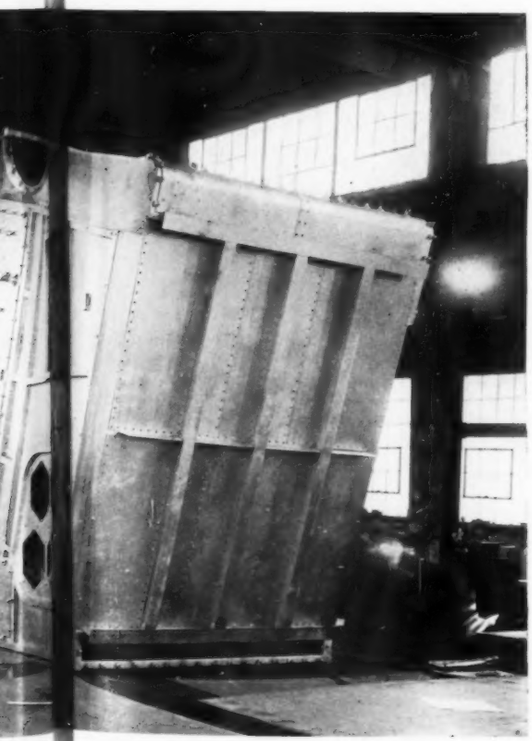


TABLE V

Tankers Under Construction or on Order in U. S. Yards

Type	D. W. T.	Speed	Builder	Est'd. Date of Delivery
STANDARD OIL CO. OF NEW JERSEY				
SS	16,400	15½	Sun S. B. & D. D. Co., Chester, Pa.	Oct. 1941
SS	16,400	15½	Sun S. B. & D. D. Co., Chester, Pa.	Nov. 1941
SS	16,400	15½	Sun S. B. & D. D. Co., Chester, Pa.	July 1942
SS	16,400	15½	Sun S. B. & D. D. Co., Chester, Pa.	Aug. 1942
SS	16,400	15½	Bethlehem Steel Co., Sparrows Pt., Md.	Aug. 1942
PANAMA TRANSPORT CO.				
SS	18,600	15½	Sun S. B. & D. D. Co., Chester, Pa.	May 1942
SS	18,600	15½	Sun S. B. & D. D. Co., Chester, Pa.	Sept. 1942
MS	18,100	15½	Sun S. B. & D. D. Co., Chester, Pa.	Nov. 1942
SS	16,400	15½	Bethlehem Steel Co., Sparrows Pt., Md.	Dec. 1942
SS	16,400	15½	Bethlehem Steel Co., Sparrows Pt., Md.	Dec. 1942
MS	18,100	15½	Sun S. B. & D. D. Co., Chester, Pa.	Dec. 1942
SS	18,600	15½	Sun S. B. & D. D. Co., Chester, Pa.	Jan. 1943
SS	18,600	15½	Sun S. B. & D. D. Co., Chester, Pa.	May 1943
SOCONY-VACUUM OIL CO., INC.				
SS	16,100	16½	Bethlehem Steel Co., Sparrows Pt., Md.	Aug. 1941
SS	16,100	16½	Bethlehem Steel Co., Sparrows Pt., Md.	Nov. 1941
SS	16,100	16½	Bethlehem Steel Co., Sparrows Pt., Md.	Apr. 1942
SS	16,100	16½	Bethlehem Steel Co., Sparrows Pt., Md.	June 1942
SS	16,100	16½	Bethlehem Steel Co., Sparrows Pt., Md.	July 1942
SS	16,100	16½	Bethlehem Steel Co., Sparrows Pt., Md.	Nov. 1942
SS	16,400		Bethlehem Steel Co., Sparrows Pt., Md.	Nov. 1943
SS	16,400		Bethlehem Steel Co., Sparrows Pt., Md.	Dec. 1943
PETROLEUM SHIPPING CO., LTD.				
SS	16,400	13	Bethlehem Steel Co., Quincy, Mass.	July 1941
SS	16,400	13	Bethlehem Steel Co., Quincy, Mass.	Sept. 1941
SS	16,600	13	Sun S. B. & D. D. Co., Chester, Pa.	July 1941
SS	16,600	13	Sun S. B. & D. D. Co., Chester, Pa.	Aug. 1941
ATLANTIC REFINING CO.				
SS	19,400	13½	Sun S. B. & D. D. Co., Chester, Pa.	Sept. 1941
SS	19,400	13½	Sun S. B. & D. D. Co., Chester, Pa.	Jan. 1942
SS	13,100	14	Sun S. B. & D. D. Co., Chester, Pa.	Nov. 1942
SS	14,140	14½	Sun S. B. & D. D. Co., Chester, Pa.	May 1943
CHAS. KURZ				
SS	16,400	16½	Sun S. B. & D. D. Co., Chester, Pa.	Dec. 1941
SS	16,400	16½	Sun S. B. & D. D. Co., Chester, Pa.	Mar. 1942
SS	16,400	15½	Sun S. B. & D. D. Co., Chester, Pa.	Mar. 1942
SS	16,400	15½	Sun S. B. & D. D. Co., Chester, Pa.	Apr. 1942
SS	16,400	16½	Sun S. B. & D. D. Co., Chester, Pa.	June 1942
SS	16,400	16½	Sun S. B. & D. D. Co., Chester, Pa.	July 1942
SS	16,400	16½	Sun S. B. & D. D. Co., Chester, Pa.	Aug. 1942
NATIONAL BULK CARRIERS, INC.				
MS	13,000	12	Alabama D. D. S. B. Co., Mobile, Ala.	June 1941
SS	11,600	15	Welding Ship Yards, Inc., Norfolk, Va.	Dec. 1941
SS	18,600	15	Welding Ship Yards, Inc., Norfolk, Va.	June/July 1942
STANDARD OIL CO. (CALIFORNIA)				
SS	18,225	15	Sun S. B. & D. D. Co., Chester, Pa.	Oct. 1942
SS	18,225	15	Sun S. B. & D. D. Co., Chester, Pa.	Nov. 1942
SINCLAIR REFINING CO.				
SS	10,400	14	Bethlehem Steel Co., Quincy, Mass.	Nov. 1941
SS	15,450	15	Federal S. B. & D. D. Co., Kearney, N. J.	June 1941
SS	15,450	15	Federal S. B. & D. D. Co., Kearney, N. J.	Oct. 1941
SS	10,400	14	Bethlehem Steel Co., Quincy, Mass.	Jan. 1942
SS	10,400	14	Bethlehem Steel Co., Quincy, Mass.	Feb. 1942
SS	10,400	14	Bethlehem Steel Co., Quincy, Mass.	Mar. 1942
SS	15,450	15	Bethlehem Steel Co., Quincy, Mass.	Apr. 1942
SS	15,450	15	Bethlehem Steel Co., Quincy, Mass.	May 1942
SS	15,450	15	Federal S. B. & D. D. Co., Kearney, N. J.	Feb. 1942
SS	15,450	15	Federal S. B. & D. D. Co., Kearney, N. J.	Feb. 1942
SUN OIL CO.				
MS	17,950	15	Sun S. B. & D. D. Co., Chester, Pa.	July 1942
MS	17,950	15	Sun S. B. & D. D. Co., Chester, Pa.	Mar. 1943
THE TEXAS CO.				
SS	14,140	16	Sun S. B. & D. D. Co., Chester, Pa.	Feb. 1942
SS	14,140	16	Sun S. B. & D. D. Co., Chester, Pa.	Mar. 1942
SS	14,140	16	Sun S. B. & D. D. Co., Chester, Pa.	Apr. 1942
SS	14,140	16	Sun S. B. & D. D. Co., Chester, Pa.	Mar. 1943
SS	14,140	16	Sun S. B. & D. D. Co., Chester, Pa.	July 1943
SS	14,140	16	Sun S. B. & D. D. Co., Chester, Pa.	Sept. 1943
TIDE WATER ASSOCIATED OIL CO.				
MS	2,650	10½	Charleston S. B. & D. D. Co., Charleston, S. C.	June 1941
UNION OIL CO. OF CALIFORNIA				
SS	13,000	13	Bethlehem Steel Co., Sparrows Pt., Md.	Sept. 1941
MS	13,000	13	Bethlehem Steel Co., Sparrows Pt., Md.	Feb. 1942
SS	13,000	13	Bethlehem Steel Co., Sparrows Pt., Md.	June/July 1942
SS	16,400	15½	Bethlehem Steel Co., Sparrows Pt., Md.	June 1943
SS	16,400	15½	Bethlehem Steel Co., Sparrows Pt., Md.	July 1943
GULF OIL CORP.				
SS	13,000	13	Bethlehem Steel Co., Sparrows Pt., Md.	Jan. 1942
SS	13,000	13	Bethlehem Steel Co., Sparrows Pt., Md.	Dec. 1942
SS	14,140	14½	Sun S. B. & D. D. Co., Chester, Pa.	Nov. 1942
SS	14,140	14½	Sun S. B. & D. D. Co., Chester, Pa.	July 1942
CONTINENTAL OIL CO.				
SS	13,000	13	Bethlehem Steel Co., Sparrows Pt., Md.	Nov. 1942
RICHFIELD OIL CO.				
SS	13,000	13	Bethlehem Steel Co., Sparrows Pt., Md.	Dec. 1941
TOTAL (71)	1,091,060			

Construction work on the Southeastern Pipeline leading from Port St. Joe on the Florida Gulf Coast to Knoxville.

Pipelines Planned To Relieve Threatened East Coast Shortage

Three Lines Already Contracted, Numerous Proposed Lines Under Consideration by Petroleum Coordinator, Plus Efficient Utilization of Existing Facilities May Make Rationing Unnecessary

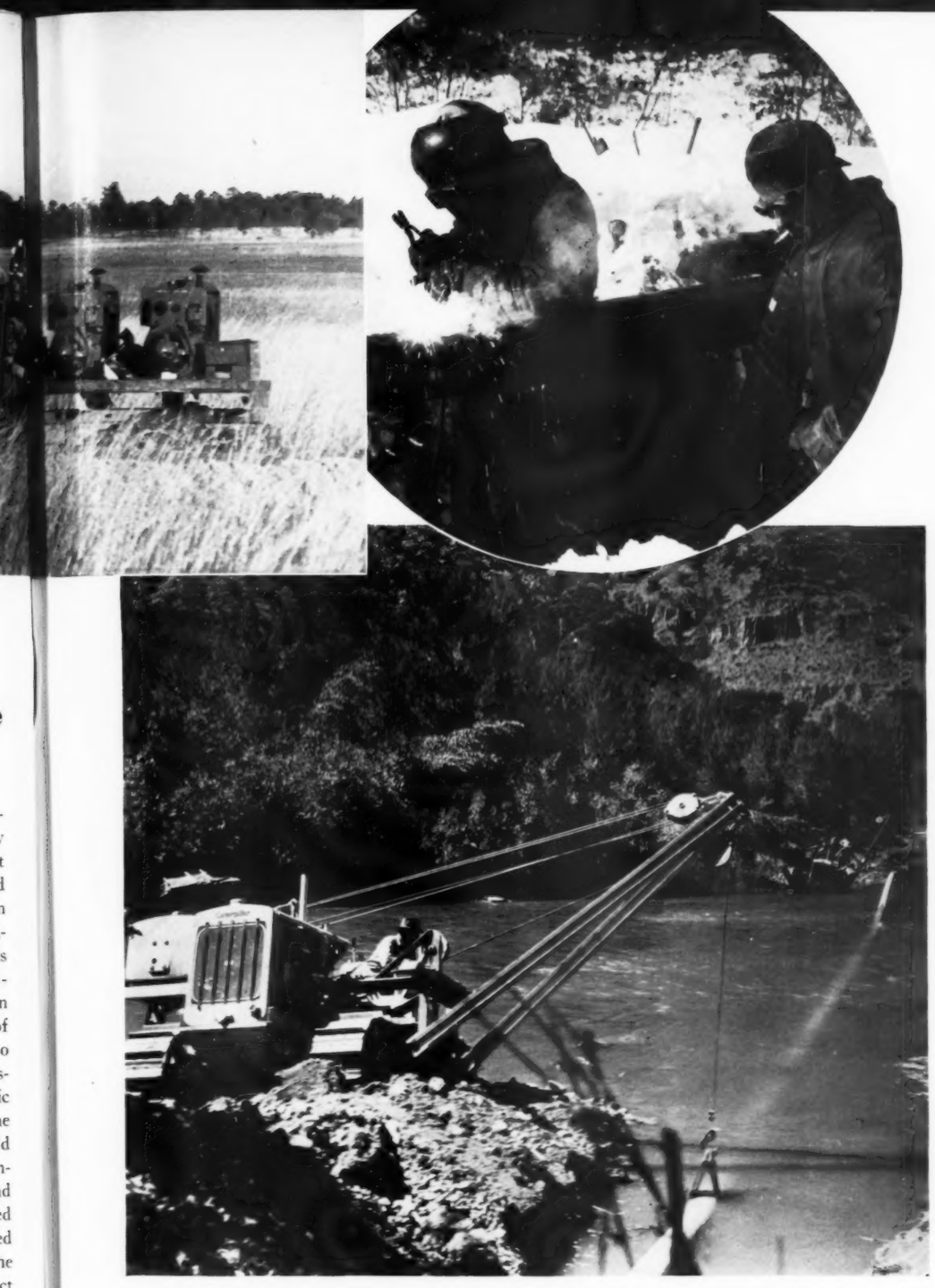
WHILE a thousand million barrels of crude oil travels by pipeline each year in the United States on part or all of its journey from field to refinery more than 90 percent of the crude pipeline mileage lies west of the Appalachians. Because of the greater economy of water transportation 90 percent of the crude oil moving to the Atlantic Coast is carried by tankers. Although the first long distance lines in the country were built to convey Pennsylvania crude to the eastern seaboard the shift of the main source of crude supply to the Gulf Coast and the competitive advantage of the water route caused a number of these lines to be converted into gasoline carriers transporting the products of eastern refineries to markets in Ohio and Great Lakes territory.

In addition to crude supplies the greater part of the petroleum products required by the eastern states followed the water route, the total movement having risen to roundly 1,400,000 bbl. per day of which some 1,250,000 bbl. was carried by a fleet of over 250 vessels. The sudden withdrawal of approximately 20 percent of these ships created a serious problem for the oil industry, threatening both a partial shutdown of Atlantic Coast refineries and a shortage of supplies for consumers in that area. In an opposite sense it was equally serious for producers and refiners along the Gulf Coast since lack of transportation meant that producing and refining operations would have to be slowed down as supplies would quickly outrun existing storage facilities even on the present restricted basis.

To avoid these unpleasant results and to avert if possible the necessity of radically restricting the use of petroleum products in Atlantic Coast areas has been the study of members of the oil industry and various Washington officials for the past several weeks. Certain measures for increasing the carrying capacity of tankers still in service have been adopted; one large company has worked out a pipeline hook-up of existing lines to supply crude to its east coast plants, and shifts from fuel oil to coal have been made in a number of industrial plants. After giving effect to these makeshift devices, however, a current shortage estimated at 250,000 bbl. per day remained and this is expected to grow in later months and to continue at least until the end of the first quarter of 1942.

As the most effective means of meeting this situation the building of additional pipelines to move crude or products, or both, from the Southwest to the Atlantic Coast has been proposed. A large number of suggestions for new lines have been put forward, some with solid financial backing by responsible companies and some requiring government assistance. Among the first proposals were a 24-inch crude line with a capacity of 250,000 bbl. to extend all the way from East Texas and Louisiana to Marcus Hook, Pa., and Bayonne, N. J., and a 20-inch products line from Louisiana to the same points with a daily capacity of 225,000 bbl. The cost of these lines was estimated at $70,000,000 each. The projects were mentioned without recommendation in the report which the fact-finding committee of the American Petroleum Institute submitted to Coordinator Ickes on June 2. Early in the discussion, however, it appeared that the Atlantic Coast demand for crude would not justify a line of the proposed size and capacity which would serve no useful purpose after the emergency unless it could be converted to a natural gas line and which in any event could hardly be completed in time to relieve a shortage which is expected to be of serious dimensions mainly during the next six to nine months. Accordingly this project was virtually shelved while the companion products line remained under consideration. It is of interest to note, however, that engineering studies reveal that a crude pipeline of this size can transport oil on an economic basis competitive with normal tanker costs.

A proposal favorably regarded by the petroleum conservation division of the Interior Department provided for a line eastward from Wood River, Ill., to Bayonne, N. J., possibly using existing lines for part of this distance. In support of this plan it was urged that capacity to handle 50,000 to 60,000 bbl. daily was available from Mid-continent and Texas fields to the Mississippi River and that the extension eastward from Wood River would be only half the length of a



Welding a short products line built last winter for Shell to supply the Boston area.

The art of laying pipelines has advanced a great distance within the last few years: new techniques and constantly improved tools make the construction of long lines possible in surprisingly short times.

through line from Texas to New York and Philadelphia and consequently could be constructed in half the time and at less than half the cost. Perhaps most important of all would be the saving in steel required for the shorter line. Proposals for at least two alternative lines to traverse the eastern half of the continent were put forward by individual groups.

Through the utilization of existing pipeline capacity east of Lima, O., the eastward movement of crude has been stepped up about 34,000 bbl. daily. The lines involved are the Southern, Tide Water and National Transit. An additional 10,000 bbl. is being moved to Buffalo and thence via barge to New York. Other moves to raise the crude flow to the east without new construction except possibly short connecting lines are under way. A noteworthy increase in capacity is being accomplished by the Gulf Pipeline which carries crude from Oklahoma to Gulf's Ohio refineries through the laying of thirteen loops which will enable the line to carry 10,000 bbl. more daily. Further enlargement of this line is under consideration by officials of the company.

In the meantime three lines which will aid in solving transportation difficulties in certain eastern areas have been definitely decided upon and construction will begin as soon as the Cole bill giving the President temporary authority to confer the right of eminent domain on pipeline companies needed for national defense has been passed by Congress. This bill was favorably acted upon by the House and at the end of June was before the Senate with expectation of early approval as soon as released by the committee.

Of the three lines definitely decided upon the first to be completed probably will be the Southeastern Pipeline, a joint enterprise of Pure Oil Company and Gulf Oil Corporation. It will extend from Port St. Joe, Florida, to Chattanooga, Tenn., by way of Albany, Macon and Atlanta, Georgia, a distance of 448 miles. The first one hundred miles of this line, from Port St. Joe to Bainbridge, Ga., has been completed and pipe has been strung over most of the remaining route so that as soon as the necessary authority to obtain passage across railroad rights of way is provided construction can move ahead rapidly with completion expected before the end of the year. The strategic advantage of this line is that it will avoid the trip around the southern tip of Florida in supplying petroleum products to a portion of the southeastern territory and that it passes near important army posts and training camps. The diameter of the line from Port St. Joe to Atlanta is eight inches and from Atlanta to Chattanooga six inches. Its daily capacity will be 18,000 bbl. and it is estimated to save the use of two to three 10,000-ton tankers. Route is shown on page 30.

A longer line serving southeastern states will be that of the Plantation Pipe Line Company, extending from Baton Rouge, La., to Greensboro, N. C., with branches to Columbus and Macon, Ga., Chattanooga and Knoxville, Tenn. This will give it a length of 1,261 miles. The company that is to operate the line is owned by Standard Oil Co. (N. J.), Standard Oil Co. of Kentucky, and Shell Oil Co.

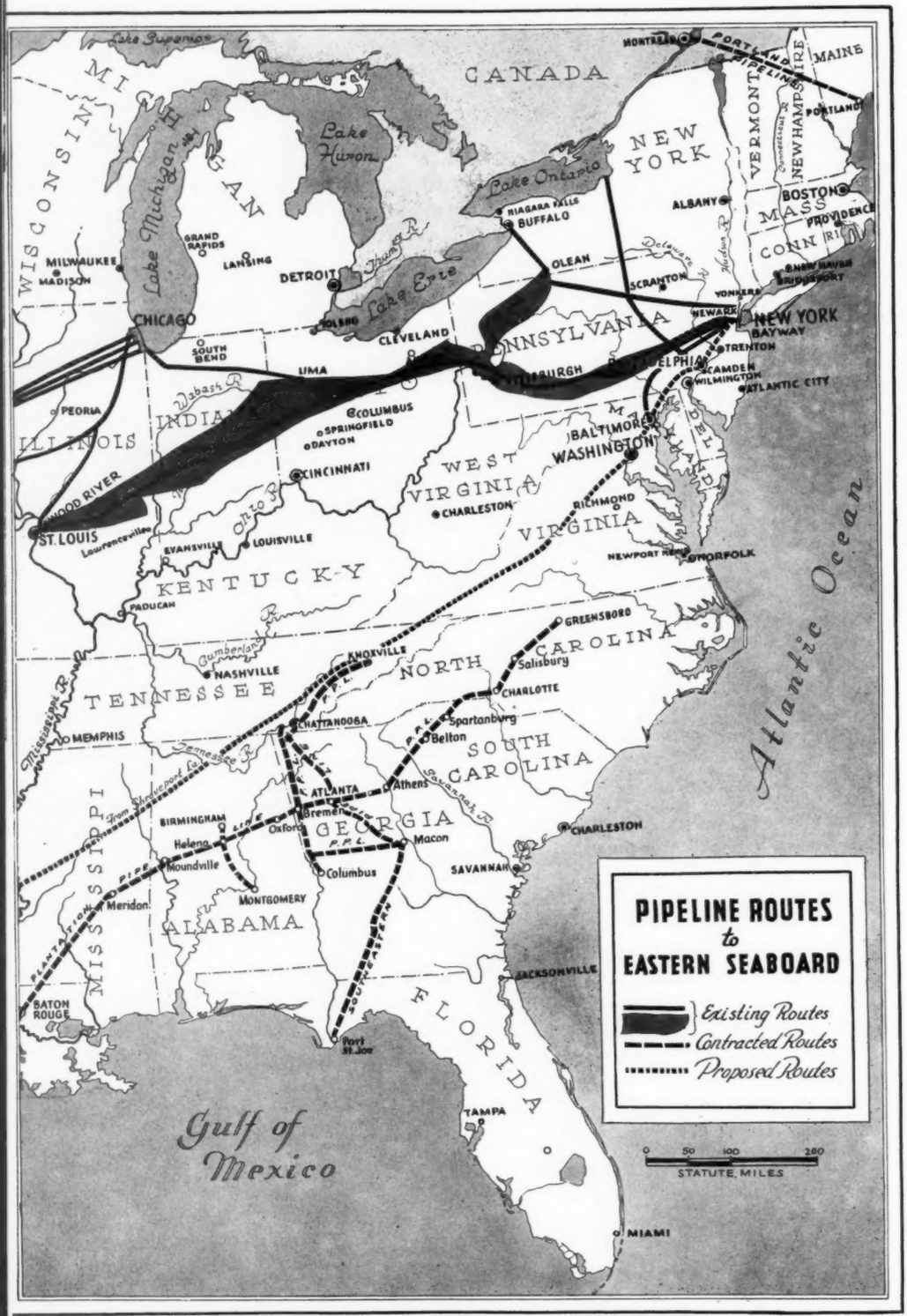
Plans for this line have been prepared for more than a year past but construction has been delayed by opposition of railway companies in the states through which the line is to run. Now, in anticipation of early removal of this barrier by enactment of the Cole bill, orders have been placed for 123,000 tons of steel pipe and the contract for building the line has been let. An office for purchase of rights of way has been established at Meridian, Miss., and other offices are to be opened shortly. Pipe deliveries are scheduled to start in July and to be completed by not later than October of this year.

As originally planned the line was to have a capacity of 33,000 bbl. daily. The main system, 794 miles in length, was to consist of 435 miles of 11-in. pipe and 359 miles of 9-in. with 468 miles of laterals of 6-in. and 4-in. diameter.

Fourteen pump stations and sixteen terminals were included in the system. Since that time plans have been revised to make the initial capacity 60,000 bbl. and it is stated that by installing additional pumps the maximum capacity can be raised to 90,000 bbl. On completion the line will replace ten to fifteen tankers and will obviate dependence on ocean transportation in serving an area which hitherto has received 85 to 90 per cent of its supplies by tanker.

Officials of the company point out that there are eighteen army camps completed or under construction in the area to be served by the line and that approximately 17 percent of the aviation gasoline required for military purposes this year is to be delivered to this area. The new line will deliver gasoline, kerosene, heating oil and tractor fuels. All told there will be sixteen intermediate terminals to assure widespread delivery of gasoline and other refined products.

The area to be served comprises 279,600 square miles or nine percent of the total area of the United States. This area, now dependent largely upon delivery by water for petroleum products, supports 16,251,000 persons, exclusive of those in military service. It has 2,300,000 trucks, buses, passenger cars, and tractors. In order to supply these various demands approximately 47,000,000 bbl. of gasoline are required per year, of which the new line can deliver 21,900,000 bbl. at normal capacity or 33,950,000 bbl. at peak capacity. Route is shown on the accompanying map.



The officers of the company are C. R. Younts, president; N. J. McGaw, vice president; F. E. Watterfield, Jr., vice president; D. F. Cocks, secretary and treasurer; and S. V. Kane, assistant secretary and assistant treasurer. The directors are C. R. Younts, R. T. Haslam, W. R. Finney, W. E. Smith, and N. J. McGaw.

The third of the lines already decided upon for the eastern area is to extend from Portland, Me., to Montreal, Canada. Construction on this new crude pipeline is expected to start at Gorham, N. H., about July 1 according to officials of the Portland Pipe Line Co., which has been organized by the Standard Oil Company (New Jersey) to construct the American portion of the line. The Canadian portion of the line will be constructed by the Montreal Pipeline Co., Ltd., also a subsidiary of Standard of New Jersey.

Initial work will be started by two crews of approximately 250 men each, one working to the east and the other to the west from Gorham. Depending upon the speed of pipe delivery, as many as six crews may be engaged in construction ultimately to rush the laying of pipe to completion by October 1. The line will be in operation about two months later.

Following a route surveyed originally by plane from a height of 17,000 ft. this continuous 236-mile tube of seamless steel pipe, the only crude oil line in northeastern United States, will pump approximately 50,000 bbl. of crude daily to the refineries of Montreal saving ten to twelve days in the time required for the long tanker route around the Gaspé peninsula and up the St. Lawrence to Canadian refineries.

Under the lease-lend act, the United States is bound to make deliveries of crude oil to Montreal refineries. The construction of the pipeline has been undertaken, according to officials of the company, to reduce the tanker time required for such deliveries and thereby help relieve the petroleum transportation shortage which is expected to affect the Atlantic seaboard.

The project will cost about $8,000,000, will give employment to hundreds of men, and will be completed, because of the vital necessity, in something approaching record time.

Starting from the terminal in South Portland, the line will send its steel shaft through the forests of Maine, under its rivers, course through a pass in the White Mountains 1,950 ft. above sea level, push through the rock bound soil of New Hampshire and Vermont, cross the frontier, traverse the plateaus of southern Quebec, dive sixteen feet under the bed of the St. Lawrence River, and pour its contents into the refineries at Montreal. The route is shown on the map.

Esso tankers, steaming northward from Colom-

bia, Venezuela, and Texas, will pull into a new wharf at South Portland and discharge their cargoes of from 100,000 to 150,000 bbl. Six storage tanks, each with a capacity of 140,000 bbl. will receive the crude. Eight pumping stations, each equipped with horizontal, triplex, power-driven plunger pumps, will send the cargoes on their way to Montreal.

The pipeline will require 32,700 tons of pipe. The latter comes in 40-ft. lengths, has an outside diameter of 12¾ in., a wall thickness of ⅜ in., and weighs 49.56 pounds per foot.

While this line will be completed before winter and others now under consideration will be completed in from four to nine months still other steps will have to be taken to relieve a shortage on the east coast that is expected to develop shortly, reaching a peak in mid-winter. As mentioned on other pages of this issue, Ralph K. Davies has suggested an increase of 10 percent in the capacity of existing transportation facilities by more efficient handling of oil shipments throughout; this would include a speeding up of loading and unloading, dispatching, inspection and other operations. There is also under consideration by congress with virtual assurance of passage, a bill authorizing the Secretary of Commerce to suspend the load line limitations for the duration of the emergency. Under the authority of this act it is proposed to permit winter loading to the summer mark; summer loading to the tropical mark; and tropical loading to the tropical-fresh water mark. Such action would add an estimated three per cent to the capacity of the existing American flag tanker fleet.

In the final analysis, however, immediate relief from the threatened shortage must depend on the railroads being able to fill the gap until the longer term adjustments—notably the pipeline program—reach completion. On this subject there seems to be little agreement. J. J. Pelly, president of the American Association of Railroads has stated that full and immediate use of a tank car surplus of 19,000 units capable of handling 200,000 bbl. per day is entirely feasible. The Association asserts that this statement, made several weeks ago, still stands despite a tendency on the part of defense agency officials including Petroleum Coordinator Ickes to discount the contribution that the railroads are now prepared to make towards relieving the oil transportation shortage.

Reasons for these doubts are found in the conclusions reached by those who have made a study of rail transportation of oil. A surplus of 19,000 tank cars may exist at certain times of year but in a sense this represents a working reserve that is drawn upon for peak transportation seasons. Such a peak in transportation appears to exist at present and gives promise of being maintained until the end of the year. Moreover, the railroads will have far more general freight to handle in coming months than they have in the past several years. The increase in industrial activity may itself throw a strain on rail facilities that would leave scant margin for huge additional shipments of petroleum.

Coating and wrapping a small line preparatory to dropping it in the trench.

On the other hand it has been pointed out by railroad men that more efficient use of existing facilities can add substantially to rail capacity. Shippers have not in the past felt the necessity for quick turn arounds on individual cars. A five day loading week has prevailed, cars arriving at destination on Fridays or Saturdays being held over the week-end. Shippers have not always routed shipments as expeditiously as possible and receivers have held cars to unload at their convenience, it is alleged.

An urgent request for the correction of these conditions has been sent to owners and lessees of tank cars at the instance of Ralph Budd, transportation commissioner, Office for Emergency Management. Mr. Budd has estimated that of the 150,000 tank cars in the United States, 9,000 are owned by railroads and are used mainly for transportation of company supplies; about 130,000 are owned by oil companies or by private companies which lease them to oil companies as needed. M. J. Gormley of the Railroad Association pointed out that the railroads had put into service 125 new locomotives between January 1 and May 1 this year and now have an additional 354 locomotives under construction. Mr. Gormley asserted that the railroads would have no trouble providing the motive power if the companies would make the necessary efforts to expedite the handling of the cars.

A survey of tank cars and of various means of expediting their movement is now under way. Meanwhile, in anticipation of a heavier oil movement by rail, two railway companies, the Nickel Plate and the Lackawanna, have filed with the Interstate Commerce Commission tank car tariffs from pipeline terminals in the Pennsylvania, Ohio area to the Atlantic Seaboard.

(c) Harris & Ewing

Petroleum Coordinator Ickes speaking to representatives of the oil industry at a meeting in Washington on June 19.

U. S. Oil Industry Organizes for DEFENSE

Industry Meets Ickes, Petroleum Coordinator, In Washington, to Tackle Transportation, Other Problems — Justice Department Pledges Anti-Trust Immunity

SPEAKING before a thousand oil men from all parts of the country assembled in Washington on his invitation Petroleum Coordinator Ickes on June 19 said: "Let harmony, cooperation and a mutual desire and willingness to solve the problems now confronting us be the watchword not only of this meeting but of all our future relations. . . . It is anticipated that the solution of most of our problems will be secured by all parties becoming informed and then working out an agreement to which all adhere on the basis of their honor and because of an urge to defend their country. . . . In our effort to aid the embattled democracies, in our effort to give 'all out' aid to brave England, we are seeking to preserve your right and the right of all other Americans to continue in the American way. In this effort the oil industry needs the aid of government and government needs the aid of the oil industry. It is a joint task, a task in which we can acquit ourselves with credit only if we earnestly and harmoniously cooperate, only if we are willing to make the sacrifices that may become necessary."

Highlight of the meeting was the appearance of Acting Attorney General Francis Biddle and his assurance that the Department of Justice is prepared to recognize for the period of emergency, the legality of joint industry action taken at the direction or on the recommendation of the Office of the Petroleum Coordinator for National Defense and approved by the Attorney General. "If our answer was that your recommendation was proper you and the industry could go on and carry it out without fear," said the Acting Attorney General, speaking directly to Secretary Ickes. Buttressing this statement that cooperative action by the industry, taken with such joint approval, would not be used as a basis for future punitive action Mr. Biddle accepted the suggestion of Secretary Ickes that such agreements be published in The Federal Register and that a previous exchange of letters between the heads of the two departments be so published. Included with this correspondence was a letter from former Attorney General Jackson to John Lord O'Brian of the O.P.M., written on April 29, which Mr. Biddle endorsed as representing the position of his department toward agreements made under the supervision of the Petroleum Coordinator. The significant paragraph of this letter reads as follows:

"Acts done in compliance with the specific requests made by the Office of Production Management or the Office of Price Administration and Civilian Supply and approved by their general counsel in accordance with the procedure described in this letter will not be viewed by the Department of Justice as constituting a violation of the antitrust laws and no prosecutions will be instituted for acts performed in good faith and within the fair intendment of instructions given by the Office of Production Management or the Office of Price Administration and Civilian Supply pursuant to this procedure."

Having thus cleared the atmosphere by assurance that the Department of Justice will exercise the "wide range of discretion" which Mr. Biddle declares is allowed it by the anti-trust acts in time of emergency Coordinator Ickes outlined his plans for organizing the industry to act cooperatively in dealing with the oil situation. This plan provides for the division of the country into the following five districts: (1) Eastern —including all Atlantic Seaboard states from Maine to Florida together with Pennsylvania and West Virginia; (2) Middle Western—taking in all states from Ohio to the Dakotas, Nebraska, Kansas and Oklahoma, including also Kentucky and Tennessee; (3) Southern—comprising all Gulf Coast states, Arkansas and New Mexico; (4) Rocky Mountain—taking in Colorado, Wyoming, Utah, Idaho and Montana; (5) Pacific Coast—including Arizona and Nevada as well as California and Washington.

Four industry advisory committees for production, refining, transportation and marketing are to be set up in each of the five regions. These committees of operating oil men, appointed by

the coordinator on the recommendation of the industry, will consist of not more than 12 members each, will represent all phases of the industry and will be geographically balanced. The chairmen of the four committees in each region will serve as a general coordinating committee.

The meeting in the auditorium of the Interior Department building with Mr. Ickes in the chair was reminiscent of the N. R. A. oil-code days even to the appearance of R. K. Davies, newly-appointed deputy petroleum coordinator upon whom Mr. Ickes will depend for administering details of the coordination between the industry and the several government defense agencies and those concerned in allocating civilian oil supplies. Mr. Davies, who until he accepted his present post was vice president and sales manager of the Standard Oil Company of California, worked with Mr. Ickes on the N. R. A. oil-code as chairman of one of the regional committees and since that time has maintained his acquaintanceships in Washington. His reception by the assembled oil men was most cordial, indicating the general approval by the industry of his appointment to this important post of deputy Petroleum Coordinator.

Mr. Davies told the meeting that presentation of a comprehensive outline of the problems which confront the industry and their solution was obviously impossible, not only because of the complexity of the problems but also the "unforeseeable" character of future events. Needless to say, he continued, the transportation shortage on the Atlantic Coast, due to the tanker diversions to the British supply service, made speedy action on alternative transportation methods "the matter of the moment." In addition to the diversion of tankers from customary routes, notably discontinuance of shipments of oil from California to the eastern seaboard, already accomplished by arrangements between the Coordinator's Office and the Sun Oil and Standard Oil of California to put their tankers in the Gulf to Atlantic ports trade, Mr. Davies mentioned the Bailey-Bland act vesting in the Secretary of Commerce, the authority to lower the load lines of tankers for the period of the emergency, not to extend after June 30, 1943. It was estimated that a change in the load lines within a limit of safety will add about three percent to carrying capacity of the present tanker fleet or 10,000,000 to 15,000,000 barrels annually in potential deliveries to the Atlantic Coast. An act, approved unanimously by Congress, sets aside the load line limit established by International Load Line treaty of 1930 which was applied to coastwise shipping by a special act of Congress in 1935 although the United States was not obligated to take such action.

In the field of alternative transportation methods Mr. Davies mentioned, without giving details on discussed projects, the need for "more complete use of existing pipelines," the construction of new ones under the Cole bill which asserts the federal right of eminent domain for pipeline construction and "negotiations with the railroads looking to utilization of all tank car capacity."

"I think also," he added, "a very large contribution can be had from the cumulative effect of a large number of individually small adjustments in a whole series of activities, such as loading, dispatching, pumping and inspection which would bring as much as 10 percent additional effective service from existing transportation."

He further warned the industry that reserves must not be wasted and the future might bring "special conservation measures with respect to particular reserves of oil, strategically and geographically so located as to be indispensable to the Navy." While a shortage of metals and materials may prevent competitive drilling, it should be realized by those in and out of the industry that "the search for new fields should be the last activity to be restricted," he said. Unless the discovery rate is maintained, Mr. Davies emphasized, reserves not only will be depleted but existing fields will be forced to overproduce to maintain adequate supplies "with all the waste of oil and gas that entails."

The industry also he said should give consideration to "competitive cross-hauling, which while a practice which may promote future efficiency despite present-day waste, can scarcely be supported, on any theory in time of emergency."

This brought Mr. Davies down to the subject of rising costs of operation and their effect upon prices with the suggestion "that a coordination of activities throughout the industry such as will now be possible may operate to avoid increasing prices to the consuming public." This, he added, was an objective both of the Office of the Coordinator of Petroleum and the Office of Price Administration and Civilian Supply.

Leon Henderson, Price Administrator, who followed Mr. Davies, disclosed that letters had been sent out to refiners and marketers of petroleum products throughout the country requesting that they make no further price advances without prior consultation with OPACS. He explained that the price situation generally was particularly acute because of the pressure of increased purchasing power which is not being accompanied by a proportionate rise in the production of civilian goods. His remarks along this line while not particularly directed at petroleum products lent weight to reports that Congress is to be asked for statutory price fixing authority as a substitute for the rather doubtful status of OPACS, created by executive order.

Acting Attorney General Francis Biddle.
(c) Harris & Ewing

Civilian motoring in the United Kingdom has been cut 65 percent since the war started, the conference was told by E. E. Soubry, chairman of the board of the Anglo-American Oil Company and a director of the Oil Trade Board which controls petroleum activities in Great Britain. Mr. Soubry referred to various steps that are being taken to insure rapid and effective handling of war supplies. George B. Cottrelle, oil controller of Canada, addressed the meeting telling of the steps taken by his government to conserve oil supplies and emphasizing the point that in the matter of defense the problem of Canada and that of the United States was a joint one and should be treated as such.

The Petroleum Coordinator invited the oil group to suggest names for membership on the regional committees and assured them that any suggestions they might have to offer would be carefully considered. He reiterated his desire to work in harmony with the industry and said that he would act promptly in any situation that seemed to call for immediate attention.

In one of his first moves to deal with transportation matters Coordinator Ickes tangled with the State Department by holding up a consignment of lubricating oil loading at Philadelphia for shipment by tanker to Japan.

Although he contended he did not believe "a single gallon of gasoline even to Great Britain" should be shipped out of Atlantic ports the State Department countered swiftly and as if to dispel any international implications, placed all petroleum products under the licensing control system and barred shipments from the Atlantic seaboard except those destined to the British Empire, Egypt, Eire and Latin-American countries. The order signed by President Roosevelt stated that no additional restrictions on shipments of petroleum from Gulf and Pacific Coast ports are contemplated, indicating that no new restrictions are aimed at either Japan or Russia.

In effect two general export license orders were issued, one authorizing petroleum export shipments to British ports and countries of the Western Hemisphere and the other covering shipments from Gulf and Pacific Coast ports of petroleum products not previously placed under control. On the basis of the statement of the White House that "no additional restrictions on petroleum shipments from Gulf or Pacific ports are now contemplated," it was assumed Japan may continue to obtain from the west coast shipments of petroleum products not hitherto

licensed. Exports of aviation gasoline, aviation lubricating oil and blending agents have been embargoed except to Britain and Latin America.

In a second major move Mr. Ickes was successful in effecting an arrangement with the Lease-Lend Administration and the Navy Department by which American refineries will be given an opportunity to supply "not less than 50 percent of the petroleum products purchased for the use of Great Britain." Heretofore Britain has been obtaining petroleum products from South American supplies, but now that English requirements are to be filled by the use of American funds, Mr. Ickes held that it appeared "only right that American refineries be given opportunity to supply at least part of the business." The agreement with the Lease-Lend Administration and the Navy will give them opportunity to bid on 50 percent of the requirements. The Navy Department is acting as purchasing agent for the Lease-Lend Administration in the matter of oil.

"It should be distinctly understood," said Mr. Ickes, "that the placing of British orders with American refineries will not affect the transportation situation which is causing the deficiency of supply on the East Coast. Tankers already engaged in hauling oil for the British will continue that haulage. But they may, under this arrangement, haul the products of American refineries.

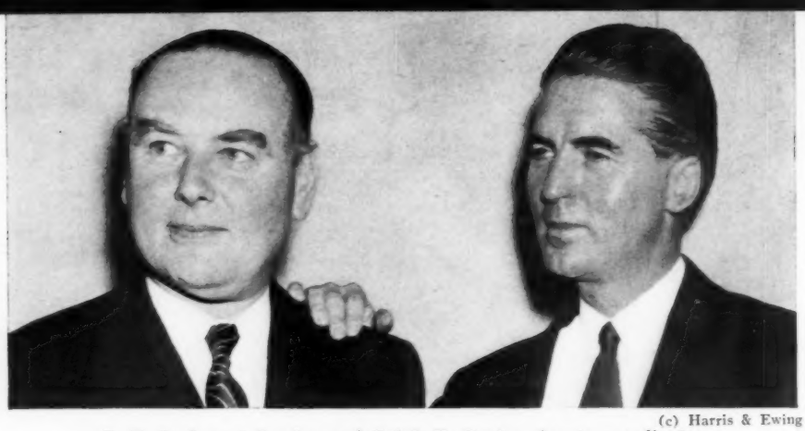
It will not in any way diminish the supply available for the East Coast. Our job, as far as the East Coast is concerned, is still to find means of transportation."

The first purchases with Lease-Lend funds under the arrangement providing for not less than 50 percent of the requirements from American sources, are for a three months' period.

Meanwhile the office of Petroleum Coordinator in an effort to protect small fuel oil distributors obtaining their supplies from major companies dispatched the following wire to 21 large companies operating on the Atlantic coast, all of whom might reasonably be expected to have some fuel oil supplies in storage:

"As the proration of petroleum products by supplying companies to commercial consumers, distributors and retailers may inadvertently cause maladjustments of wide variety and in some cases result in serious losses by those who can least afford them it is recommended that all supplying companies in the Atlantic Coast area refrain from establishing policies that change existing supply relationships until a comprehensive plan can be worked out between them and this office. In pursuance of this recommendation, you are requested to supply such data on existing supply and account relationships as you consider necessary for a forthcoming conference."

The transportation problem involved in moving adequate supplies from the Gulf Coast to the Atlantic Seaboard is the matter of most immediate concern to the petroleum administration and is the subject of daily conferences between members of the industry, Deputy Coordinator Davies and the petroleum conservation board of the Interior Department. Numerous pipeline proposals have been advanced and are being examined with a view to the time required for their construction and the extent of the relief they will provide. The tank car situation is another subject of investigation, considerable differences of opinion having developed between representatives of the railways and others as to the number of available cars not now in service and the ability of the railways to move them.



(c) Harris & Ewing

E. E. Soubry of London and Ralph K. Davies, deputy coordinator.

Meanwhile the Cole bill, on the enactment of which prompt construction of new pipelines depends, has continued to hang fire in Congress. The bill, which authorizes pipeline companies to exercise the right of eminent domain in obtaining rights of way, promptly passed the House early in June and was sent to the Senate. There it was referred to the Committee on Interstate Commerce and a sub-committee of which Senator Truman is chairman decided to hold hearings on the bill although the subject had been extensively covered before the House sub-committee. Adoption of the bill by the Senate is held to be reasonably certain but such action necessarily awaits the conclusion of hearings and submission of the committee report.

Action by the office of the Petroleum Coordinator will be based to a considerable extent on a modified version of the report drawn up by the fact finding committee of the American Petroleum Institute for submission to the Office of Production Management and subsequently to Secretary Ickes and the conservation board.

According to this report, petroleum requirements of the Atlantic Coast states for 1941 and 1942 were estimated as shown in the accompanying table in comparison with demand for 1940.

Estimated Requirements of Atlantic Coast States.
(Thousands of Barrels)

	1940	1941	Inc. %	1942	Inc. %
Gasoline	199,057	223,939	12.5	235,000	4.9
Distillate fuel	82,587	88,781	7.5	98,800	11.3
Residual	146,784	161,462	10.	169,500	5.
Kerosene	37,897	40,739	7.5	43,909	7.8
Lubricating and other	39,597	40,221	1.6	41,718	3.7
Total	505,922	555,142	9.7	588,918	6.1

This demand is supplied in large part by manufactured products from refineries in the Gulf Coast section and to a less extent by crude from the same area or from South America which is processed in refineries located in Atlantic ports. Of the total movement, averaging at present nearly 1,500,000 bbl. daily, upward of 95 percent travels by tanker and less than five percent by pipeline or other methods. Sufficient cargo capacity to handle this quantity was available, according to the survey, up to June 30, 1941. Following the withdrawal of fifty tankers assigned to shuttle service in moving oil destined for Great Britain—a shortage of ocean transportation will exist which is estimated as follows:

Shortage of Coastwise Tanker Capacity.

Quarterly Period	Thousands of Dead Weight Tons
Third quarter 1941	300,000
Fourth quarter 1941	636,000
First quarter 1942	547,000
Following quarters 1942	105,000

For the nine months following July 1, 1941 this represents an average shortage of 494,000 dead weight tons. The period from Oct. 1, 1942 to Mar. 31, 1942 is indicated as presenting the most critical petroleum supply problem.

As the report points out, its estimate was based on meeting normal East Coast demands without restriction on the use of petroleum products but in the computation allowance was made for certain increases in eastward pipeline transportation which had been provided for at the time of the report. This added pipeline flow of crude, amounting to 44,000 bbl. daily, was estimated to replace the services of eleven tankers of average 10,000 tons capacity.

Estimated Possible Saving in Tanker Tonnage.

Methods	Dead Weight Tons
Easing of load line limitations on tankers	130,000
Substitution of Gulf Coast supplies for intercoastal movement	50,000
Rearrangement of South and Central American supplies	40,000
Relief through southeastern pipe line construction	14,000
More effective use of barges	30,000
Total	264,000

The above would equal in transportation value 26 ships averaging 10,000 dead weight tons and would reduce the estimated shortage of 49 tankers to 23 with a capacity of 230,000 tons. "This could be protected by rail movement" comments the report, "but at appreciably higher costs." The possibility of making railway transportation available to this extent, however, is specifically stated as subject to further investigation.

16% INCREASE in Oil Industry's Earnings

By Henry E. Rose

Net Income For 23 Representative Companies at $2.06 Per Share Shows Best Level Since 1937—Increased Wages and Taxation With Possible Price Control Cloud Future Outlook.

THE all-clear signal for the American oil industry has been slightly clouded by several recent events. Because of these, and other political and economic uncertainties, any financial forecasts must be tempered accordingly.

Perhaps the most important change is the appointment, early this month, by President Roosevelt, of his Secretary of the Interior, Harold L. Ickes, as federal coordinator of the industry. In his letter of appointment, the President conferred upon Secretary Ickes broad powers over the nation's oil business. The industry has no alternative but to cooperate, although it is not especially elated over the appointment. It should have preferred, if a coordinator had been deemed necessary, that a selection should have been made from the industry as in the first World War.

Just what Mr. Ickes' plans are for industry have not been revealed. He has, for years, been an ardent advocate of federal control and only recently—subsequent to his appointment—reiterated the belief that oil should be under permanent federal guardianship.

Needless to say, the appointment of Mr. Ickes was an unexpected event. Only a short while ago, the House of Representatives' Oil Committee, headed by Representative Cole, of Maryland, reported to President Roosevelt, in response to his request, that its investigation disclosed no necessity, or urgency, for placing the oil industry under government control.

Another event revolves around transportation. Until a few months ago, oil had been one of the few basic industries prepared to render all-out aid in the defense program. Its penchant for over-building placed it in this position in all divisions. Moreover, the excess capacity was ample to provide for all normal demands which might be made upon it. Early in May, however, a call was issued by the Maritime Commission for the industry to furnish 50 of its tankers to a ship pool to aid Great Britain. The ships were turned over and are now in a shuttle service between Caribbean and north Atlantic ports where the oil is transferred to British tankers for delivery to Great Britain.

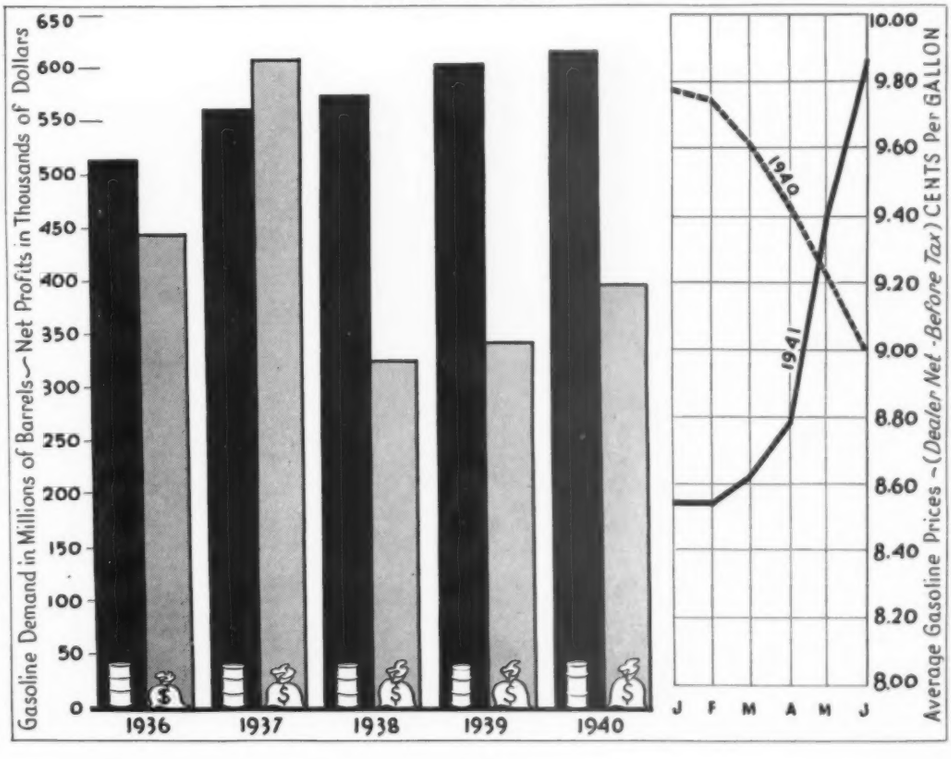
One of the principal reasons, avowedly, for Mr. Ickes' appointment is to develop ways and means of relieving transportation difficulties and to see that supplies are delivered to the eastern seaboard. Whether or not this can be accomplished in time is problematical. There is no assurance, moreover, that further tanker withdrawals will not be made for the British supply service.

Other factors which are apt to exert an adverse influence on operations include:
(1) The prospect of price control by the Office of Price Administration and Civilian Supply. Several instances already have arisen on the west coast and in Ohio where this governmental bureau has asked either deferment, or rescission, of price advances. This power in respect of price control, however, may be flexible if it can be shown that higher quotations are justified.
(2) Higher wage costs. Most workers in the industry, since April, have been granted increases in pay averaging five percent.
(3) The prospect of increased federal taxation, although the impact on the oil industry because it is engaged in the development of a natural resource, is not likely to be as onerous as upon purely processing companies.

On a favorable side are several factors which are likely to, and probably will, offset the adverse influences sufficiently to warrant the forecast that profits this year will be higher than in 1940, and be at the best level since 1937, which year established a record for the industry. These include:
(a) a sharply increased, and new record, demand for products;
(b) An improved statistical position, especially in respect of gasoline, petroleum's major product;
(c) Improved crude oil prices, averaging 16 cents a barrel, and the best since fall 1938;
(d) Increased prices for refined products—gasoline in most areas is at the highest level since the fall of 1937—so that the refiners' profit margin is better than for several years past.

The improvement in crude prices took place early in April when an advance averaging six cents a barrel was posted. This was followed in

U. S. Gasoline demand in relation to net profits of 26 representative oil companies: Average gasoline price in 1940.



FIVE YEAR FINANCIAL REVIEW OF

	Net Income	Per Share of Com.	Net Working Capital	Net Capital Assets	Funded and/or Long Term Debt	No. of Pref. Shares	No. of Com. Shares	Surplus
Amerada Corp.								
1940	$1,775,734	$2.25	$3,124,396	$12,016,406	.....	.....	788,675	$4,774,541
1939	1,230,764	1.56	3,047,353	11,801,630	.....	.....	788,675	4,576,157
1938	1,634,486	2.07	3,680,800	11,591,429	.....	.....	788,675	4,922,742
1937	2,400,028	3.04	3,714,837	11,684,811	.....	.....	788,675	5,055,621
1936	1,983,901	2.52	4,183,364	10,684,074	.....	.....	788,675	4,232,943
Atlantic Refining Co.								
1940	6,217,453	2.11	45,152,518	145,997,524	25,124,849	148,000	2,663,999	80,629,957
1939	5,032,282	1.66	42,408,126	144,784,942	25,249,849	148,000	2,663,999	78,053,554
1938	4,310,913	1.40	40,723,724	142,172,139	25,406,849	148,000	2,663,999	73,270,967
1937	9,935,045	3.51	22,824,810	134,126,471	508,858	148,000	2,663,999	71,733,501
1936	7,342,197	2.59	34,627,900	113,737,073	522,793	148,000	2,664,000	64,841,504
Barnsdall Oil Co.								
1940	2,193,471	.97	4,031,723	13,106,604	7,562,757	.....	2,251,017	1,926,084
1939	1,720,292	.76	4,534,676	11,671,041	7,575,979	.....	2,258,779	4,999,629
1938	2,837,894	1.26	2,884,341	11,416,400	5,000,000	.....	2,250,344	5,947,243
1937	1,903,029	.84	1,465,258	11,628,526	3,861,743	.....	2,250,344	6,396,684
1936	2,262,544	1.00	4,611,623	10,044,519	5,000,000	.....	2,247,974	7,471,507
Consolidated Oil Corp.								
1940	3,792,602	.28	91,144,403	194,838,625	69,030,627	.....	13,531,915	172,115,495
1939	7,540,880	.55	98,179,411	196,742,476	70,481,429	.....	13,751,726	183,590,985
1938	7,737,712	.55	97,874,488	201,583,988	72,179,196	.....	13,751,846	187,049,022
1937	20,809,295	1.44	78,130,681	209,354,872	48,564,969	54,491	13,915,617	190,874,640
1936	16,728,929	1.18	78,118,866	204,171,446	49,720,570	56,592	13,944,886	182,866,672
Continental Oil Corp.								
1940	4,317,658	.92	30,010,809	73,082,217	21,906,177	.....	4,682,568	70,848,410
1939	6,304,504	1.35	38,844,133	63,132,258	21,071,600	.....	4,682,572	71,213,345
1938	5,139,755	1.10	45,753,061	55,862,435	21,071,600	.....	4,682,581	69,591,015
1937	13,948,460	2.98	30,395,524	50,970,433	.....	.....	4,662,388	69,133,647
1936	9,612,597	2.05	28,749,999	45,374,654	.....	.....	4,738,593	61,875,373
Creole Petroleum Corp.								
1940	6,834,170	.98	4,113,744	71,507,758	.....	.....	6,974,356	42,356,117
1939	9,590,366	1.37	7,463,866	68,869,647	.....	.....	6,974,356	42,496,303
1938	11,464,757	1.64	15,953,482	56,966,860	.....	.....	6,974,356	39,889,293
1937	11,218,752	1.61	17,073,570	52,162,879	.....	.....	6,974,356	35,638,823
1936	8,596,448	1.23	14,757,203	51,304,681	.....	.....	6,975,383	32,469,427
Gulf Oil Corp.								
1940	22,150,277	2.44	125,388,013	357,743,026	48,590,062	.....	9,076,702	107,609,862
1939	15,315,781	1.69	97,534,014	351,936,147	51,112,595	.....	9,076,202	111,929,542
1938	13,017,076	1.43	126,830,235	350,468,996	75,613,092	.....	9,076,202	115,308,601
1937	31,854,065	3.51	118,361,299	339,864,527	79,913,155	.....	9,076,202	125,071,106
1936	26,356,003	2.90	81,837,311	313,146,546	73,605,313	.....	9,076,202	102,756,263
Humble Oil & Refining Co.								
1940	28,107,503	3.13	41,137,524	313,065,476	42,417,737	.....	8,987,940	138,406,211
1939	29,950,288	3.33	40,298,938	304,322,126	42,721,438	.....	8,987,840	132,409,925
1938	35,800,354	3.98	37,440,543	295,440,883	42,640,805	.....	8,987,840	120,663,584
1937	46,924,001	5.22	8,245,084	269,905,258	1,648,181	.....	8,987,840	103,172,103
1936	34,183,527	3.80	26,962,743	226,310,687	266,945	.....	8,987,840	74,846,370
Imperial Oil, Ltd.								
1940	17,638,717	.65	45,061,925	41,243,450	.....	.....	26,965,078	50,721,888
1939	19,250,071	.72	43,959,297	41,125,802	.....	.....	26,965,078	49,936,345
1938	25,950,580	.96	60,013,498	40,253,368	.....	.....	26,965,078	61,202,540
1937	26,442,157	.98	64,239,390	39,808,431	.....	.....	26,965,078	73,879,023
1936	25,628,285	.95	71,088,190	43,028,222	.....	.....	26,965,078	81,133,214
Mid-Continent Petroleum Corp.								
1940	2,967,394	1.60	21,549,569	37,074,524	.....	.....	1,857,912	42,627,669
1939	2,650,502	1.42	20,139,581	37,668,405	.....	.....	1,857,912	41,994,545
1938	1,043,791	.56	18,614,252	38,158,682	.....	.....	1,857,912	41,309,132
1937	5,304,877	2.85	18,404,109	39,090,197	.....	.....	1,857,912	42,231,402
1936	4,777,578	2.57	17,771,833	37,841,889	.....	.....	1,857,912	40,519,334
Ohio Oil Co.								
1940	8,733,164	1.02	31,772,031	88,050,956	14,000,000	339,337	6,563,377	19,772,774
1939	1,492,086	(A) 4.29	30,468,732	90,583,528	18,000,000	354,537	6,563,377	15,596,459
1938	4,582,964	.25	28,340,324	96,328,461	.....	354,537	6,563,377	16,231,596
1937	11,862,107	1.31	28,777,772	96,387,559	.....	548,077	6,563,577	17,710,658
1936	7,881,571	.70	32,053,658	(k) 98,929,683	.....	548,077	6,563,377	18,570,516
Phillips Petroleum Co.								
1940	11,590,317	2.61	29,130,002	173,186,916	32,589,696	.....	4,449,052	41,081,214
1939	9,833,314	2.21	24,305,805	174,933,218	33,598,518	.....	4,449,052	38,389,001
1938	9,049,122	2.03	43,662,204	160,683,926	41,417,920	.....	4,449,052	37,453,790
1937	24,113,874	5.42	30,657,681	158,719,012	25,613,235	.....	4,449,052	37,302,764
1936	17,875,489	4.22	23,362,194	146,812,781	14,009,257	.....	4,449,052	29,153,170
Pure Oil Co.								
1940	8,718,057	1.21	22,700,307	115,237,430	3,478,686	725,431	3,982,031	54,604,294
1939	8,290,418	1.11	23,186,755	112,484,522	2,361,852	721,956	3,982,031	50,781,463
1938	5,412,903	.38	19,793,782	112,992,307	2,455,668	721,429	3,982,031	47,603,610
1937	11,403,805	2.15	26,285,254	106,907,568	2,665,760	725,431	3,738,143	46,052,869
1936	7,658,372	1.63	22,195,113	115,413,650	35,194,361	359,617	3,285,120	41,385,155

UNITED STATES OIL COMPANIES

	Net Income	Per Share of Com.	Net Working Capital	Net Capital Assets	Funded and/or Long Term Debt	No. of Pref. Shares	No. of Com. Shares	Surplus
Seaboard Oil Co.								
1940	$1,300,993	$1.05	$2,698,551	$3,980,081	.....	.....	1,244,383	$3,439,929
1939	1,746,464	1.40	2,306,744	3,988,415	.....	.....	1,244,383	3,496,862
1938	1,895,790	1.52	2,368,575	2,968,905	.....	.....	1,244,383	2,994,781
1937	2,447,130	1.97	2,374,122	6,273,767	.....	.....	1,244,383	2,343,374
1936	2,485,675	2.00	1,726,067	5,750,047	.....	.....	1,244,383	3,084,451
Shell Union Oil Corp.								
1940	15,654,678	1.05	95,975,926	227,769,292	85,000,000	331,225	13,070,625	34,797,441
1939	11,805,713	.76	87,762,089	261,105,471	85,000,000	341,100	13,070,625	16,872,684
1938	11,318,423	.70	84,619,113	262,819,975	82,427,000	341,100	13,079,625	17,661,533
1937	20,668,880	1.44	54,800,185	269,950,889	61,021,430	341,100	13,070,625	17,350,251
1936	22,494,364	1.57	52,628,694	262,438,076	58,764,000	343,500	13,070,625	11,579,155
Skelly Oil Co.								
1940	3,316,678	3.28	7,694,042	48,279,943	16,000,000	.....	981,348	26,316,591
1939	2,360,783	1.99	7,788,739	45,009,713	9,000,000	63,000	995,348	25,581,908
1938	2,650,055	2.27	7,588,908	45,455,396	9,026,681	64,500	995,348	24,588,248
1937	6,488,346	6.06	7,823,108	40,868,979	11,734,598	66,300	1,008,549	16,297,582
1936	4,850,314	4.42	5,476,993	38,014,854	10,852,493	66,300	1,008,549	11,647,109
Socony-Vacuum Oil Co., Inc.								
1940	36,409,055	1.17	197,297,070	455,058,914	133,727,410	.....	31,708,452	178,326,612
1939	34,452,710	1.10	189,357,083	493,139,415	126,419,256	.....	31,708,452	232,514,577
1938	40,106,917	1.29	(R) 205,882,740 (R)	458,244,042	127,511,486	.....	31,707,991	213,664,902
1937	56,808,264	1.82	223,646,989	457,125,753	128,063,217	.....	31,708,452	189,654,276
1936	42,909,362	1.38	166,291,713	424,296,564	68,372,972	.....	31,151,071	157,766,869
Standard Oil Co. of California								
1940	22,487,586	1.73	88,553,262	445,593,600	25,000,000	.....	13,102,900	230,320,612
1939	17,882,505	1.36	88,095,224	446,839,002	25,000,000	.....	13,102,900	235,332,469
1938	28,875,653	2.20	64,489,533	449,350,905	.....	.....	13,102,900	236,967,035
1937	41,254,778	3.15	61,529,257	449,046,236	494,900	.....	13,102,900	229,298,177
1936	23,310,223	1.78	58,160,244	448,223,984	5,000,000	.....	13,014,754	217,070,827
Standard Oil Co. of Indiana								
1940	33,597,342	2.20	191,548,946	396,068,183	19,488,465	.....	15,271,982	294,114,662
1939	34,142,643	2.23	186,837,449	378,973,235	8,713,074	.....	15,272,014	277,716,485
1938	27,771,976	1.82	174,727,455	374,827,700	10,346,658	.....	15,272,020	280,850,326
1937	55,950,784	3.66	156,367,152	371,586,035	8,598,544	.....	15,267,030	284,891,637
1936	46,883,448	3.09	165,331,918	347,502,925	4,094,689	.....	15,196,241	265,367,464
Standard Oil Co. (N. J.)								
1940	123,886,346	4.54	485,854,976	1,078,223,509	187,553,785	.....	27,278,666	618,087,745
1939	89,128,756	3.26	466,607,198	1,121,061,376	190,638,179	.....	27,285,919	593,326,890
1938	76,053,170	2.86	489,684,138	1,172,251,955	192,850,838	.....	26,618,065	562,863,025
1937	147,993,147	5.64	434,929,054	1,193,534,803	139,268,806	.....	26,224,767	562,569,681
1936	97,774,583	3.73	432,337,756	1,042,421,175	84,573,564	.....	26,224,767	491,093,355
Standard Oil Co. of Ohio								
1940	6,209,008	7.44	13,259,188	47,677,770	5,314,681	120,000	753,740	27,285,388
1939	5,602,499	6.64	15,403,625	43,965,974	6,702,971	120,000	753,740	23,180,208
1938	1,964,605	1.81	13,719,806	42,644,255	6,929,358	120,000	753,700	19,327,778
1937	3,362,960	3.66	10,625,869	39,874,172	.....	120,000	753,740	18,682,477
1936	4,194,314	4.76	12,764,256	34,730,917	602,026	120,000	753,740	17,112,466
Sun Oil Co.								
1940	7,969,068	3.03	22,552,302	93,278,795	18,066,869	100,000	2,434,840	15,958,344
1939	6,959,677	2.74	29,845,003	84,353,938	21,275,033	100,000	2,318,918	15,091,224
1938	3,085,119	1.07	31,085,619	79,192,720	21,386,250	100,000	2,315,960	11,182,964
1937	9,544,085	4.17	23,813,873	74,090,757	10,330,326	100,000	2,328,330	10,953,754
1936	7,563,554	3.44	20,628,939	70,007,334	6,467,583	100,000	2,156,825	10,053,004
The Texas Corp.								
1940	31,547,562	2.90	124,231,625	365,656,993	111,834,697	.....	10,875,994	197,634,702
1939	32,886,807	3.02	136,423,045	354,847,254	102,521,409	.....	10,876,139	200,636,059
1938	23,139,030	2.13	113,780,180	339,074,007	62,869,727	.....	10,876,882	188,912,882
1937	54,574,319	5.02	127,058,606	329,648,904	65,667,412	.....	10,875,006	187,358,901
1936	38,260,341	4.10	93,179,802	295,631,713	88,819,129	.....	9,336,739	135,946,875
Tide Water Associated Oil Co.								
1940	9,519,083	1.14	39,973,976	132,143,846	38,200,000	500,000	6,372,676	33,148,237
1939	8,958,971	1.05	40,018,720	126,832,660	36,848,615	500,000	6,368,667	33,094,647
1938	10,427,273	1.28	40,361,831	126,130,786	38,386,548	500,000	6,373,253	30,462,068
1937	15,801,383	2.09	42,019,706	123,923,854	39,168,798	500,000	6,369,175	28,285,935
1936	10,217,928	1.11	31,990,255	120,062,336	15,925,172	626,221	6,288,512	25,634,444
Union Oil Co. of California								
1940	4,606,790	.99	44,936,369	120,260,932	37,958,500	.....	4,666,270	22,283,270
1939	5,846,241	1.25	48,600,877	116,536,861	38,018,500	.....	4,666,270	22,350,171
1938	6,862,758	1.47	39,408,084	115,792,578	18,018,500	.....	4,666,270	22,953,078
1937	12,061,332	2.58	41,888,136	112,174,792	18,026,500	.....	4,666,270	21,691,244
1936	6,133,398	1.40	36,147,816	107,856,361	20,326,500	.....	4,386,070	15,868,299

(k) Exclusive of good will, patents, etc. (A) On preferred stock.
(R) Revised because of European War and non-availability of certain figures.

less than two months with another lift of ten cents a barrel. Coincident with the initial advance in crude, and in fact for a short time before that, firmness developed in prices of principal refined products, especially gasoline.

In the accompanying chart, as an illustration, is shown the trend of gasoline prices (undivided dealer, before taxes) since January 1 based on reports from 50 leading cities.

From this compilation it is obvious that the real upward price move began in April. The June quarter profits of the industry, hence, will show marked improvement over those in the March period, and the general profit pattern this year is a reversal of that in 1940.

Because principal refined products prices in the initial three months of this year were considerably below those a year ago (when some hopes were entertained that war business might develop), aggregate profits of the industry this year—in the three months ended March 31—were 22 percent smaller than in the corresponding period of 1940. For 25 companies issuing interim reports, net income in the March quarter of this year totaled $34,561,585 as compared with $46,088,104 in the similar 1940 period. Ten companies, embracing mostly solely producing units, whose operations were not affected by price changes, and some Mid-Continent and West Coast companies which enjoyed a better refined products price structure than in other areas reported increased net income. The remaining 15 companies had reduced profits. These 25 companies are shown in the accompanying tabulation with net income and per share earning available to their outstanding common stock.

Net Income and Per Share Earnings for 25 Companies
Three Months Ended March 31

	1941		1940	
	Net Income	A Share on Com.	Net Income	A Share on Com.
Amerada Corp.	$506,644	$.64	$459,241	$.58
Atlantic Refining	2,747,992	.98	3,122,916	1.12
Barnsdall	486,569	.21	357,737	.15
Continental	1,215,562	.26	1,380,434	.29
Darby Petroleum	111,579	.32	41,093	.12
Houston Oil	423,280	.26	478,503	.31
Louisiana Land & Exp.	388,441	.13	239,732	.08
Mid-continent Petroleum	524,629	(*)	1,454,678	(*)
North Central Texas	19,724	(*)	19,754	(*)
Ohio Oil	1,933,772	.22	2,292,294	.27
Pan American P. & Tran.	1,056,397	.22	2,253,991	.48
Phillips Petroleum	3,307,892	.74	3,286,620	.74
Plymouth Oil	245,806	.24	586,441	.56
Quaker State	218,055	.24	291,116	.31
Richfield of Cal.	723,442	.18	947,550	.24
Seaboard Oil	264,358	.21	502,949	.40
Shell Union	3,621,794	.28	5,314,158	.37
Skelly Oil	898,917	.91	773,281	.68
Standard of Cal.	4,799,184	.37	4,534,623	.35
Superior Oil (Del.)	49,588	.03	42,169	.03
Texas Corp.	6,600,000	.61	12,800,000	1.18
Texas Gulf Producing	89,387	.10	182,765	.20
Texas Pacific Coal & Oil	195,597	.22	179,691	.20
Tide Water Associated	2,859,950	.36	3,780,220	.50
Union Oil (Cal.)	1,273,006	.27	766,148	.16
TOTALS	$34,561,585		$46,088,104	

(*) Before federal taxes.

The heads of the two largest companies presented estimates of their organizations' profits in the early months of this year, at annual meetings. Standard Oil Co. (N. J.) in the first six months of 1941, reported W. S. Farish, president, should have earnings of from $75,000,000 to $80,000,000, a gratifying showing in view of the lower price levels in this year's first quarter. A year ago, in the first six months, net profits were estimated at $85,000,000. John Brown, president of Socony-Vacuum Oil Co., Inc., estimated his company's net earnings in the first four months at $10,500,000, including its equity in 50 percent owned companies. This was 30 percent less than in the similar period of 1940. He remarked, moreover, that the position of the domestic industry has improved since the first quarter; prices for products have strengthened and gasoline inventories have been reduced.

With all income accounts for 1940 now available, it is evident that aggregate net income of the 23 leading American companies, used in WORLD PETROLEUM's tabulation, was 16 per cent higher than in 1939, and at the best level since 1937, when a record was established. Net income of these companies last year totaled $397,067,919, equal to $2.06 a share of combined common shares outstanding, after allowing for preferred dividends. It compared with $341,134,880 in 1939, equal to $1.78 a common share, and with $324,717,742, or $1.70 a common share, in 1938. The record for 1937 was $607,423,900, equal to $3.20 a share of common stock then outstanding. All but seven of the companies—Seaboard, Standard of Indiana, Texas, Union of California, Consolidated, Continental and Humble—had increased profits last year. The most substantial gains were reported by Standard (N. J.), Shell Union, Ohio Oil, Standard of California, Atlantic Refining and Gulf.

In line with the improved profit showings for 1940, the aggregate cash dividend payments of the 23 companies on their common shares, of $210,999,700, were 13 percent higher than in 1939, when a total of $185,812,500 was distributed. Last year's disbursements on common stock represented 54 percent of earnings applicable to equity shares. In addition to the cash, Sun Oil Co. distributed a stock dividend of five percent to its common stockholders. The largest cash payment to equity holders was made by Standard of N. J. It amounted to $47,735,535, equal to $1.75 a share, and compared with $33,461,089, equal to $1.25 a share, a year earlier. In 1939, however, it also distributed a stock dividend of 2½ percent. Increased payments, largely in the form of extras, were made by Gulf, whose total cash distribution was $1.25 a share against $1 in 1939; Mid-Continent 80 cents against 60 cents; Shell Union 75 cents against 50 cents; Skelly $1.25 against 75 cents; Standard of Indiana $1.50 against $1.25, and Standard of Ohio $2 against $1.50. Ohio Oil showed considerable improvement by paying 45 cents last year on common against nothing in 1939.

Companies which paid smaller dividends last year included Standard of California distributing $1 against $1.10 in the previous year; Tide Water Associated 70 cents against 80 cents; Union Oil $1 against $1.05; Barnsdall 60 cents against 90 cents and Consolidated Oil 72½ cents against 80 cents. The remaining companies' disbursements were unchanged from those in 1939 as may be seen from the preceding pages.

Working capital position of the 23 companies revealed a small increase in 1940. The total of such funds aggregated $1,759,717,468 against $1,721,993,250 a year previously. Especially large increases were shown by Shell Union, Socony-Vacuum, Standard of New Jersey and Gulf, the latter three with substantial overseas interests. Those companies with sizable investments in England, Europe and North Africa, last year set up contingent reserves against possible irrecoverable losses which may have been, or may be, sustained in connection with such investments. The largest were established by Standard of N. J. and Socony-Vacuum. Each transferred $75,000,000 from surplus. Socony-Vacuum used $16,000,000 of that amount as a reserve for possible losses in the Barco concession in Colombia, South America, where results have been disappointing and estimated crude reserves are less than originally contemplated. The Texas Corporation which is jointly interested with Socony in the Barco, established a similar reserve against the property.

The year 1940 witnessed a small increase in funded and/or long term debt for 20 of the 23 companies. These debts, at the year-end, aggregated $942,844,997 against $992,210,297 in the previous year, and the low of recent years (1937) for 16 of these companies amounting to $628,150,432. Since the year-end the debt has been further increased by approximately $23,000,000 although the retirement of preferred stocks was far in excess of the new borrowings. Actually there has been a saving in fixed charges before deductions for common stocks.

Shell Union, as an instance, sold $15,000,000 of 2¾ percent debentures in January, using the proceeds therefrom and resorting to Treasury cash, to redeem $33,122,500 of 5½ percent preferred stock which had been outstanding. Ohio Oil Co. increased its outstanding debt by $3,000,000 in March through a refunding operation whereby it obtained a bank loan of $17,000,000 at 1¾ percent outstanding serial notes. With the new money ($3,000,000) and part of its Treasury Cash, it elected a redemption of about $12,000,000 (35 percent) of its outstanding preferred stock. The position of equity holders, hence, has been materially improved. Sun Oil Co., in April, called its $10,000,000 of six percent preferred stock and offered an exchange to holders in a new 4½ percent issue. Unexchanged shares were called for redemption.

Standard Oil Co. of Ohio sold privately $5,000,000 of serial debentures bearing interest at rates ranging from 2.65 to 3.00 percent to increase its working capital. Earlier this year the company had planned to redeem its $12,000,000 of five percent preferred stock and offer debentures, but postponed the step because of uncertain market conditions at the time.

PETROLEUM'S PART IN AXIS STRATEGY

By Dr. Walter Levy

German Military Machine, Using Blitzkrieg Tactics, Presently Unhampered by Oil Shortage: But Requirements of Continental Europe Create Imperative Need for Additional Supplies to Prosecute a Prolonged Conflict.

JUNE 22, 1941

FOR THE conquest of Poland, Denmark, Norway, Holland, Belgium, France, Jugoslavia and Greece the Nazi war machine required no more oil than is produced in three or four days in the United States. That so little oil would suffice for military operations on such a scale was one of the biggest surprises of this war. When hostilities started in September, 1939, allied strategy placed great reliance on the fact that oil is one of the few sinews of war in which Germany's supplies were known to be strictly limited. Certainly no other raw material is more vital than petroleum for this is a war of machines, of tanks, aeroplanes and oil fueled ships. It was generally accepted that the Nazis would be unable to fight a long war. Britain and France would not have to defeat the Nazis on land, but only to prevent the Reich from defeating them. If they should succeed in doing that, they could, so they thought, rely on their strength and Germany's weakness in other directions notably in raw material deficiencies to bring them victory.

Why then have these hopes failed, why has Germany's war effort not yet been hampered through lack of oil, and why has the activity in vital industries of the Reich not yet decisively been handicapped by a shortage of petroleum products considered so vital in prewar startegy?

To some extent Germany's potential oil resources have been underestimated yet estimates by German statisticians placed the country's probable war requirements at 85,000,000 to 150,000,000 bbl., far above the amount that she has been able to obtain. There have been some developments favorable to Germany that were not foreseen such as the Russian-German agreement of August 1939 which secured valuable supplies for the Nazis until the outbreak of the Russo-German war a few days ago; the subjugation of Rumania in October 1940 also improved the German oil situation: but these do not explain the wide divergence between anticipated requirements and what must be actual demand.

The real answer is to be found in the form of warfare that Germany has adopted, the short sharp campaigns employing vast mechanical forces with intervening lulls permitting a fresh accumulation of supplies for the next move. Whether or not the oil situation influenced the adoption of the blitzkrieg it certainly is admirably suited to making a limited oil supply go a long way. Consumption of oil products, it is true, is on an enormous scale while fighting lasts, but it is maintained only for a matter of weeks. As soon as one objective is achieved the fronts become quiet while preparations are made to deliver the next blow. Operating in this manner German military demand has been only a fraction what it would have been under earlier methods. With civil requirements reduced to a minimum by rationing and use of substitutes total war-time demand for domestic and military purposes, has not exceeded and possibly has not equaled the peacetime level prior to 1939.

As a result of five years of intensive work, the Reich succeeded in obtaining by 1940 an output of domestic crude oil, oil from coal, motor ben-

British convoys conduct tankers to British ports: despite difficulties and delays, access to Western Hemisphere supplies put the British in a far better oil position than the Germans.

(c) British Combine

(c) British Combine

Contraband control is one means the British use to assure that no vital oil supplies reach Germany

Dr. Walter Levy, the author of the accompanying article arrived a short time ago from London, where, for many years, he had been in charge of the intelligence and statistical work of the Petroleum Press Bureau. During the last part of his stay in England he was mainly concerned with an examination of the oil supply position of the various countries, and in making an extensive study of economic warfare. He has just finished a book on "Oil and War," which, as the editors have had occasion to see, contains a wealth of information on the preparations made by the belligerents previous to the war and on their measures and experience since the outbreak of war.

A tremendous array of German tanks that have proved so effective: but in a sustained conflict they will require large quantities of Diesel fuel.

zole, power alcohol and substitutes of not much less than 39 million barrels. At the same time provision had been made for increased imports from Rumania (and Russia), which in 1940 exported together some 17 million barrels to Germany. Total quantities of mineral oils available to the Reich in 1940 amounted thus to about 56 million barrels. Sources of estimated supplies compared with those of 1938 are shown in the accompanying table.

Sources of Germany's Oil Supples.
(In Thousand Barrels)

	1940	1938
Crude oil production	8,000	4,240
Synthetic oils	24,000	10,200
Alcohol, bensole substitutes	7,000	6,120
Imports from Rumania	11,200	7,625
Imports from Russia	6,000	570
Imports from overseas	.....	34,500
Total available	56,200	63,255

Includes production of Austria and Czechoslovakia, German occupied Poland and Alsace.

These supplies were more or less sufficient to cover requirements, though appreciable obstacles were encountered in satisfying the demand for certain derivatives such as lubricants, Diesel oil and technical gasolines. Rumania was not able to produce them in sufficient quantities and their synthetic production still offered some difficulties. Bottlenecks in supplies presumably were eliminated by withdrawals from stocks accumulated over a number of years.

Military consumption during the campaigns, according to a German statement, did not exceed the estimate calculated by the German oil administration by more than 5,000 bbl. This could easily be covered for the blitzkrieg idea was indeed very successful. Poland was conquered in eighteen days; the subjugation of Norway and Denmark and the whole western campaign did not require more than two months, and Greece and Jugoslavia had to give up after about two weeks of fighting. Oil consumption during the Polish campaign did not exceed two million barrels, while the invasion of Holland, Belgium and France, required some nine million barrels, about half the quantity of oil stocks found by the Germans in these countries. Germany's oil consumption for all her campaigns up to the invasion of Russia has been less than a quarter of her annual peace-time requirements.

If Germany stood alone; if she did not have Italy as her ally and had not conquered practically the whole of continental Europe, her oil position today would be quite satisfactory, so long as Britain did not achieve air superiority. But, as matters stand, Germany is now responsible for the oil supplies of nearly every European country.

Italy had tried in the same way as Germany to obtain oil autrachy, especially after the ill-fated attempt by the League of Nations to impose oil sanctions during the Abyssinian campaign. But the lack of natural crude oil deposits within the country or its possessions and the absolute insufficiency of her coal resources made it impossible for her to copy the German example. Her only domestic supplies were in Albania which was able to produce some two million barrels a year all of which went to Italy compared with a total demand in 1938 of 23 million barrels.

To fight a major war on the side of Germany it was necessary for Italy to build up very large stocks in advance, or to be able to achieve victory in a blitzkrieg before her limited supplies were exhausted, or to gain access to new sources of production. When the war between Germany and England and France broke out in September, 1939, Italy's stocks were, after the Spanish adventure, on a rather low level.

Stocks however were increased rapidly between September, 1939 and June, 1940, and amounted to at least one year's peace-time requirements when Italy started hostilities against France and England. Meanwhile Italy had increased her tanker fleet over a number of years to 426,000 tons by June, 1939, and had created a domestic refining industry, easily capable of supplying total Italian requirements of finished products if crude supplies were available. Italy's entry into the war made crude supplies subject to the British blockade and for some time during the Greek campaign even the Albanian supplies were interrupted; many of Italy's refineries and the special plants at Bari and Leghorn for the production of aviation gasoline from the low quality crude oil of Albania were bombed and bombarded by the English. Appreciable oil stocks were lost in the campaigns in the North and East Africa. As a result, the oil resources of Italy have reached or are near their distributional minimum. Germany has to see that they do not fall below this figure for otherwise the industrial life of her ally would be disorganized and the army and navy immobilized. Assuming that Albania will be able to supply two to three million barrels a year and that alcohol, methane gas and other substitutes will replace another two million barrels of oil, Italy's import requirements should still amount to some 15 million barrels per annum.

German occupied countries present a similar condition. Their own production with the exception of Poland and now possible Hungary which are self-supporting, is extremely small. Domestic production of crude oil, motor benzole, power alcohol and oil from coal in German occupied Poland, Denmark, Norway, Belgium, Holland, France, Greece and Yugoslavia is less than four million barrels a year, while their peace-time requirements exceeded 65 million barrels. It is true that the war has shown that it is possible to reduce mineral oil consumption by a high percentage without impairing essential industrial activity. Private motor traffic may be largely eliminated; commercial goods transport over long distances may be taken over by the railways as far as possible; trams may be used for urban goods transport. Kerosene for lighting and heating purposes may be replaced by gas or electricity and fuel oil by coal. Wood, gas, or electricity may be used to drive lorries and motor cars. Though these measures reduce the standard of living and can be achieved only at the expense of an enormous wear and tear on the industrial apparatus of the country, it can still be done for some time. But there will always remain a certain consumption which cannot be further reduced if production is not to come to a standstill; demand for industrial lubricants, tractor kerosene, gasoline and Diesel oil cannot be eliminated altogether anywhere in Europe.

The possible rate of reduction will be different for the various derivatives and will vary from country to country. Gasoline requirements usually can be reduced by a much higher percentage than those of industrial lubricants, and bunker fuel oil demand in Germany and occupied Europe is only a fraction of the peace-time consumption. Broadly speaking it may be stated that it should prove impossible to restrict consumption by more than two-thirds to three-

(c) U. S. Navy Recruiting Bureau

U. S. aircraft carriers and other craft patrol the Atlantic which now serves as the main highway for supplies to Britain.

quarters of the pre-war level. If Germany wants to benefit from the industrial and agricultural producing capacity of conquered Europe, she will have to provide the necessary quantities of oil. The Reich has thus to find at least 15-20 million barrels of oil. Stocks in the occupied territories at the reduced rate of consumption may have lasted for nine months or so. But at present, supplies in these countries should be dangerously near to their distributional minimum. In France railway services have been virtually stopped for lack of lubricants.

Besides the occupied states, Germany will have to supply oil to most of the neutrals, non-belligerents or Axis partners including Sweden, Switzerland, Finland and Bulgaria. Industry in nearly all these countries is working mainly for the benefit of the Reich within the German new order. Another five million barrels may be the minimum which is required by those countries.

When, contrary to her expectations, Germany had to continue the war after the French armistice, the most difficult problem for her was how to assure the requirements of continental Europe. Exploitation of the Rumanian oilfields was the first obvious choice. In December, 1939, a contract for oil deliveries of some 13 million barrels during 1940—about 40 percent of the country's exportable surplus—had been concluded. But now Germany needed all the oil which Rumania could produce. In October, 1940, German troops took over the "protection" of the Rumanian oilfields. A little later a ten year agreement for economic reconstruction was concluded and Rumania promised to send some 23 million barrels of oil products to Germany in 1941. Though some of the requirements of the occupied countries may be covered from these deliveries, the import demand of Italy, the neutral states and unoccupied France is certainly not included and will amount to at least another 20-25 million barrels. Rumania's total exportable surplus in 1940 was, however, below 27 million barrels, distribution of which is revealed in the accompanying table.

Rumanian Exports of Petroleum Products

(In Thousand Barrels)

	1940	1938
Germany	11,236	7,886
England	3,882	4,255
Italy	2,041	3,218
Greece	1,405	1,507
Jugoslavia	1,294	1,062
Turkey	1,139	406
France	732	2,391
Bulgaria	719	603
Switzerland	699	742
Tunisia	510	617
Egypt	462	2,135
Morocco	449	206
Palestine	280	522
Hungary	241	1,380
Syria	180	691
Algeria	100	134
Other countries	474	3,977
Bunkers	1,132	2,593
Total	26,975	34,325

a) Including Austria and Czechoslovakia.
b) Exports ceased after the collapse of France.

Even if Germany could divert all the Rumanian exports to Axis controlled countries, supplies would fall far short of the minimum requirements of about 45-50 million barrels. Exports of such quantities would require a crude oil production of about 55-60 million for barrels for domestic consumption in Rumania amounted to some 15 million barrels in 1940. Actually, however, Rumanian crude oil output has been declining for a number of years and amounted to 42.5 million barrels in 1940 as against 45.6 million barrels in 1939. The official Rumanian program provides for an increase by 2.2 million barrels in production during 1941. But it is doubtful whether even this modest rise can be achieved. The lack of American equipment has already led to a sharp decline in drilling activity and the falling trend of production has not yet been checked despite the efforts of Nazi engineers.

Secondly, the available and planned transport facilities on the Danube and by railways between Rumania and her markets are insufficient for export of the quantities required. Of the 34 million barrels exported in 1938 only one million barrels were transported by rail and some seven million barrels via the Danube. The balance, amounting to 26 million barrels, went by tanker from Constantza through the Black Sea, the Mediterranean and the Atlantic, a route now closed to the Axis by the British navy.

Ever since the outbreak of war, Germany has concentrated her efforts on organizing transport by land and river to handle increased quantities of petroleum. Complete political and economic control of the countries through which these routes led was established during 1940 and early in 1941; this was considered essential to assure an uninterrupted flow of oil supplies. Hungary, whose railways were widely used for this oil transport, became an adherent of the Axis, and Bulgaria, through which country the Danube runs was also asked to join. There remained only Yugoslavia. A specially difficult part of the navigation on the Danube, the Iron Gates, is situated in this country. When she refused to ratify the Axis pact, she became automatically the next victim of Nazi aggression. One week after the conclusion of the Balkan campaign, transport on the Danube, so Hitler told the Reichstag, could be resumed in full and no political or other obstacle confronted the Axis powers any longer in the task of expanding the transport facilities from Rumania.

According to present plans it is hoped to be able to transport by 1941-42, 21 million barrels via the Danube and eight million barrels by railways. Though it is quite probably that Germany will be able to achieve this goal it should be impossible for her at short notice to expand transport facilities to a figure much larger than 30 million barrels a year.

Finally, and perhaps even more important, distribution of Rumanian exports according to products does not correspond to European requirements for various derivatives. Shipments in 1940 by products is shown in an accompanying table of Rumanian oil exports.

Rumanian Oil Exports By Products

(In Thousand Barrels)

	1940	1938
Crude Oil	2,193	2,448
Gasoline	11,335	13,484
Kerosene	4,865	6,452
Lubricants	239	284
Gas Oil	4,852	5,511
Fuel Oil	3,491	6,146
Total	26,975	34,325

Only relatively small quantities of high octane gasoline are produced in Rumania and the output of lubricants is very small indeed. Gas oil supplies also fall far short of requirements and the exportable surplus of asphalt (some 9,500 tons in 1940) and paraffin wax (7,364 tons) constitute only a fraction of the potential demand of German-dominated Europe.

Rumanian supplies are thus not sufficient to provide continental Europe with its minimum requirements of oil products. But such a state of affairs does not justify the conclusion that the Axis will run out of oil in the near future or that it may lose the war at an early date through lack of fuel for its war machine. It should not be overlooked that the Reich will not be the first to suffer from an oil shortage; occupied and neutral European countries will have to effect the necessary economies even to the detriment of essential services. Germany certainly will not divide available supplies evenly over the whole territory under her control but will cover her own and Italy's demands first. Only what remains after that will be released to other countries, and preferably those whose industries are working for Germany.

Germany, it is true, will not be able to establish a "new order" and exploit occupied Europe if she is unable to supply it with minimum quantities of petroleum products. But this would not mean that the Reich would be compelled to lay down arms and to sue for peace. The repercussions which the disorganization of transport and industry in the various European countries will inevitably have on the whole continent would undermine Germany's economy only in a most gradual manner.

The next strategic move of Germany, which we are witnessing now is thus an attempt to gain access to new large sources of oil supplies. The question was only who would be the next victim, the oilfields of Iraq, Egypt or even Iran, Bahrein and Saudi Arabia or the Russian fields in the Caucasus. The production in the Caucasus district at 200 million barrels exceeds the combined output of the Near and Middle Eastern fields of some 120 million barrels. It is possible to establish overland connection by river and rail with the Russian fields, though Germany will doubtless continue her efforts to gain control of the Black Sea and to dominate the Eastern Mediterranean. If such an attempt should be successful she would be able to transport large quantities of Russian (and Rumanian) oil by tanker to Italian ports.

At the moment of writing, it is much too early to discuss the possible outcome of the war between Russia and Germany. But it seems cer-

tain that one of the main objects of German strategy will be the conquest of the Russian oilfields, if possible in an undamaged condition. It will be a momentous decision for Russia whether she should burn her oilfields and destroy her refineries, the moment the German parachutists are near these regions. Once done, the Russian colossus would be unable to move, the moment existing stocks were exhausted. The only potential alternative source of supplies would be Iran, but the transport problem would be very difficult indeed. Moreover, if Germany should be successful in Russia her armies probably would not stop at the gates of Iran: the oilfields in the Near and Middle East might well be the next target.

Beyond this there is the oil of the Near and Middle East. Some 120 million barrels were produced during 1940 in Iraq, Iran, Bahrein, Saudi Arabia and Egypt. It is, of course, unlikely that the British ever would allow these oilfields and pipelines to fall undamaged into German hands, or that the refineries in Abadan, Haifa, Bakrein and Egypt would still be intact if Germany should prove able to seize them. But Germany has not much choice. Only by free transport of Rumanian and Russian oil can Germany hope to be able to supply the European Continent with really sufficient quantities of oil. To insure this may involve also gaining control of Near and Middle Eastern fields.

When England, with a peace-time consumption of 85 million barrels, reviewed her oil position early in 1938, she came to the conclusion that her participation in the world's oil industry—surpassed only by the United States—and her tanker fleet of three million gross tons should be—sufficient to assure supplies in case of war. But four factors were perhaps overlooked when it was decided not to interfere with the peace economy of the country: (1) the large amount of foreign currency, required for oil purchases; (2) the dependence of Britain for certain high quality products such as aviation gasoline, lubricants, and tetraethyl lead on foreign plants; (3) the heavy rate of shipping losses, due to concentrated German attacks on tankers, and (4) the long delays arising from the necessities for convoying and insufficient facilities in the western ports of the British Isles.

Fortunately for Britain the United States stepped in and helped to correct every one of these omissions in England's war preparations. The lease-lend bill solved the financial problem and the issue of a general export license for oil products to the British purchasing commission made the tremendous capacity of American oil production and refining available for British war needs. The transfer of fifty tankers for shuttle service between the Gulf coast and South American producers and North Atlantic ports, where the oil is loaded on British tankers, is a step toward solving the formidable shipping problem.

It is true that since the outbreak of war Britain has been able to add to her three million gross tons two million tons of Norwegian tanker shipping, some half a million tons of Dutch tankers, and about 100,000 tons of Danish and Belgian ships—beside new construction and an appreciable tonnage of American tankers which have either been bought by the British or are now running under neutral flag. Nevertheless, difficulties have arisen in shipping the necessary quantities to Britain, her Empire and the battle zones in the Near East.

Appreciable quantities have been economized through rationing in Britain. Further savings, especially in the various Empire countries, could be effected. But the intensity of the air raids over Britain has increased the importance of road transport to substitute and relieve and to ease the congestion in the western ports. Military requirements also tend to rise with the lengthening of the lines of communications and naval demand has always been heavy. There is no doubt, however, that with American co-operation Britain will be able to satisfy her essential requirements. If need be, oil can be carried, as in World War I, in the double bottoms of every ship going to the British Isles.

Britain has promised all aid at her disposal for Russia. And now it seems that there is again an opportunity to attack the vulnerable points in Germany's oil economy. If Germany should be unable to conquer Southern Russia in a blitzkrieg or if she finds the oilfields thoroughly destroyed, while she has still to continue the fighting on a front extending from the White Sea to the Black Sea, she would certainly be confronted with a most difficult oil problem.

Though without fighting on a huge scale Germany might have been able to withstand a naval blockade as far as her oil supplies are concerned, she is absolutely dependent on domestic production and refining of crude oil, on the output of coal-oil and on imports from Rumania. The Russian army may be able to inflict some damage on the Rumanian oil center at Ploesti and the main ports on the Danube, through which oil is shipped to the Reich. The coal-oil industry in Eastern Germany, Czechoslovakia, and elsewhere which up to now has escaped attacks by the British is within comparatively easy reach of the Russian aerodromes. And the British air force is continuing to visit scores of major coal-oil plants in the Ruhr and in Central Germany the few refineries which produce most of Germany's lubricants and the tetra-ethyl lead plants. Attacks on some vital links in the transport system may also interfere with vital oil supplies. If the Russian army should be able to stand its ground and if the Russian and British air force could seize this opportunity to destroy the Rumanian production, refining and transport installations and to reduce seriously the German coal-oil capacity, the day should not be far distant when German oil supplies will run very low. If, on the other hand, Germany should gain control of the Caucasus, she will have sufficient oil to carry on for any length of time, depending on the solution of transport problem.

Convoys protecting shipments to England play a vital part in the struggle and on their success depends the ability of England to continue the war while the Continent suffers from a growing oil shortage.

(c) British Combine

WORLD OIL PRODUCTION

Figures in U. S. barrels of 42 gal.—Conversion ratios used are weighted averages for individual countries.

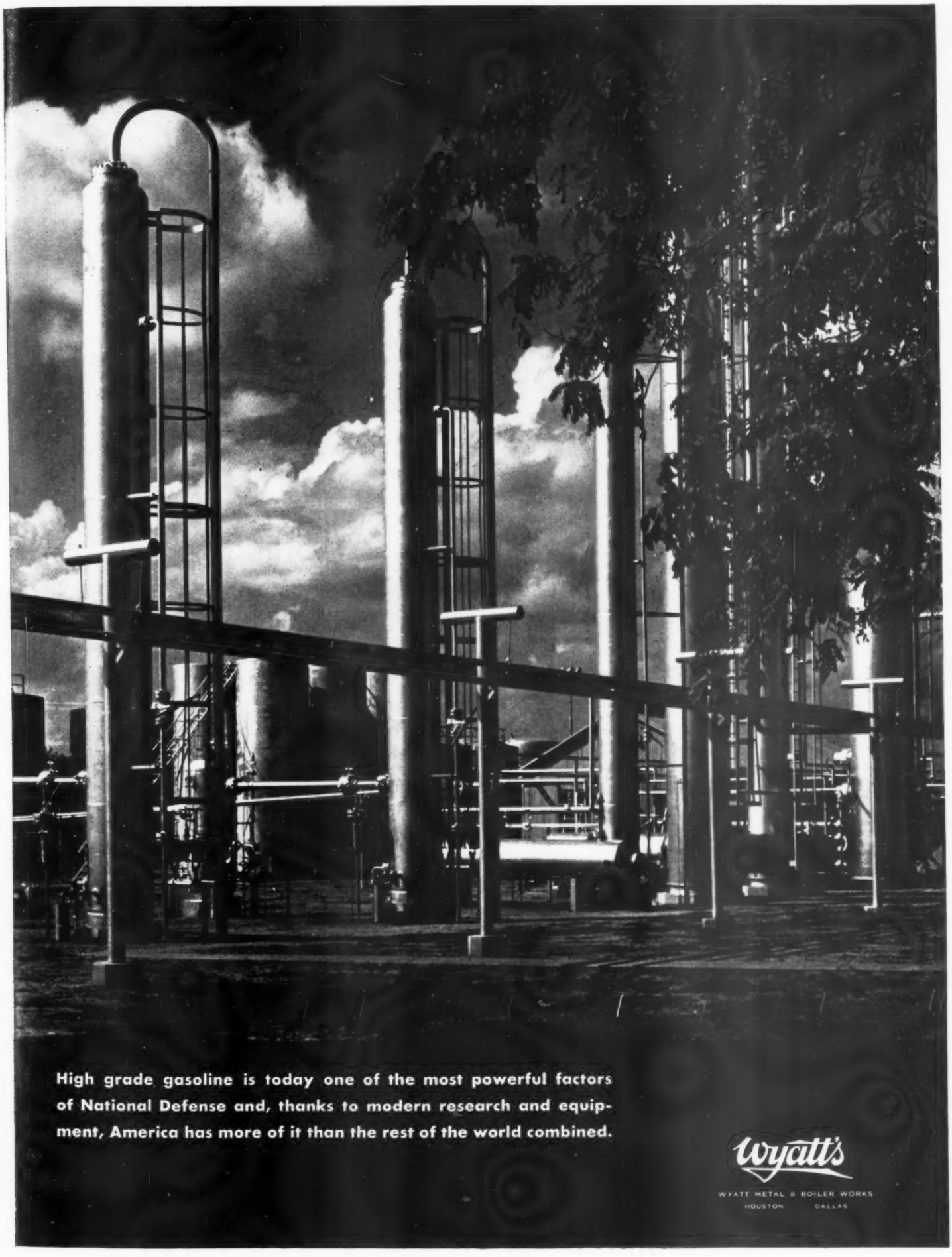
U. S. BARRELS METRIC TONS

	May 1941 Preliminary	May 1940	Jan.-May 1941	Jan.-May 1940	May 1941 Preliminary	May 1940	Jan.-May 1941	Jan.-May 1940
United States	117,020,350	118,283,000	552,357,250	576,213,500	15,832,816	16,003,653	74,733,762	77,961,559
Soviet Union	18,300,000	18,448,875	91,600,000	90,459,066	2,510,288	2,520,083	12,565,155	12,356,603
Venezuela	18,588,600	18,343,406	81,770,834	79,533,164	2,760,000	2,723,594	12,141,178	11,808,933
Iran	6,596,084	6,560,000	32,343,284	32,677,651	875,000	870,212	4,259,600	4,334,800
Netherland India: Sumatra	3,400,000	3,456,624	16,695,000	16,948,618	435,283	432,525	2,135,427	2,159,811
Borneo	1,200,000	1,106,080	5,370,400	5,423,439	153,629	141,608	687,504	694,422
Java	575,000	555,582	2,662,600	2,724,238	73,614	71,114	341,251	348,734
Molucca and other	60,000	62,310	293,800	305,626	7,681	7,967	37,720	39,115
Rumania	3,200,750	3,830,236	15,287,232	19,454,307	434,000	519,354	2,072,845	2,637,872
Mexico	2,976,000	3,412,000	14,827,000	16,374,067	437,004	501,028	2,177,237	2,404,778
Iraq	935,125	2,644,362	4,770,250	12,965,947	125,000	353,741	644,332	1,734,532
Colombia	1,800,000	2,428,000	8,595,000	11,363,890	251,046	338,633	1,198,744	1,584,919
Trinidad	1,800,000	1,634,754	8,775,004	8,015,568	253,164	229,896	1,234,177	1,127,323
Argentine	1,831,759	1,684,641	8,922,492	8,189,679	260,927	239,977	1,271,014	1,166,619
Peru	1,000,000	1,143,466	4,950,000	5,606,704	132,013	151,280	653,463	741,811
Bahrein	635,000	616,174	3,021,000	3,044,728	86,653	84,084	412,251	415,637
Burma	655,220	679,520	3,258,040	3,331,929	90,500	93,527	449,676	458,610
Canada	829,529	676,486	4,040,658	3,023,931	105,555	86,088	514,197	384,820
Brunei	464,751	487,940	2,323,313	2,392,494	62,000	65,069	309,940	319,080
Great Germany: Old Reich	375,000	384,183	1,862,622	1,883,798	53,625	55,490	266,355	272,190
Ostmark	58,000	61,194	291,959	300,086	8,646	9,703	43,524	47,689
Slovakia and Moravia	9,000	10,106	47,102	49,583	1,326	1,519	6,992	7,448
Poland	300,000	331,421	1,561,400	1,625,084	40,436	44,454	210,456	218,056
Japan	200,000	224,719	1,046,757	1,101,856	28,449	32,085	148,898	157,437
British India	185,000	191,611	916,688	939,583	25,552	26,443	126,613	129,730
Ecuador	162,161	213,000	603,019	1,025,656	21,379	28,081	79,499	135,219
Saudi Arabia	467,900	334,728	2,337,600	2,232,367	63,400	45,344	316,743	302,411
Sarawak	102,000	112,282	515,160	550,561	13,361	14,446	66,101	70,863
Egypt	650,000	465,000	3,175,000	2,268,367	92,830	66,409	453,439	323,958
Italian Empire: Albania	115,000	121,241	590,000	594,490	17,236	18,073	88,428	88,710
Italy	3,800	5,000	19,564	28,150	472	620	2,436	3,490
France	40,000	42,470	194,922	208,358	5,610	5,952	27,339	29,184
Hungary	180,000	135,000	888,150	555,000	24,216	18,160	119,486	74,650
Bolivia	10,000	9,000	51,906	42,482	1,309	992	6,739	4,864
Other Countries	48,000	49,383	239,200	242,241	6,875	7,223	34,075	34,509
WORLD TOTAL	184,774,029	188,743,794	876,204,206	911,696,154	25,290,895	25,290,895	119,836,596	124,580,386

Official Crude Oil Production Figures from 1938 to 1940

	Daily Averages Bbl.		Daily Averages Metric Tons		Bbl.			Metric Tons		
	Jan.-May 1941	Jan.-May 1940	Jan.-May 1941	Jan.-May 1940	1940	1939	1938	1940	1939	1938
United States	3,657,995	3,790,878	494,925	512,905	1,351,849,500	1,264,962,000	1,214,355,000	182,904,869	171,152,192	164,346,325
Soviet Union	606,622	595,125	83,212	81,293	216,909,066	216,727,024	206,192,000	29,702,277	29,530,168	28,859,000
Venezuela	541,528	523,244	80,405	77,690	184,761,241	205,783,650	188,429,050	27,432,998	30,533,706	27,845,286
Iran	214,193	214,984	28,209	28,518	79,151,675	78,151,332	78,320,840	10,443,546	10,367,117	10,358,495
Netherland India: Sumatra	110,562	111,505	14,141	14,209	40,685,226	41,557,013	34,538,128	5,208,709	5,320,320	4,662,836
Borneo	35,565	35,680	4,553	4,568	14,006,279	13,125,425	12,812,383	1,793,148	1,680,377	1,719,783
Java	17,633	17,922	2,259	2,294	6,557,295	6,568,714	6,955,283	839,495	842,237	933,595
Molucca and Other	1,946	2,010	249	257	762,674	836,144	607,622	97,641	107,047	81,560
Rumania	101,239	127,988	13,727	17,354	42,885,625	46,020,000	48,366,000	5,815,000	6,240,000	6,603,000
Mexico	98,192	107,724	14,418	15,820	40,000,000	39,428,141	38,505,824	5,873,715	5,794,035	5,716,423
Iraq	31,591	85,302	4,267	11,411	24,225,007	30,791,132	32,404,000	3,238,878	4,115,845	4,345,000
Colombia	56,920	74,762	7,938	10,427	25,592,890	22,036,613	21,581,588	3,569,434	3,067,568	3,007,935
Trinidad	58,112	52,734	8,173	7,416	20,218,568	19,270,256	17,736,176	2,842,918	2,710,515	2,472,943
Argentine	59,089	53,879	8,417	7,675	20,609,160	18,738,003	17,076,237	2,935,777	2,657,232	2,432,857
Peru	32,781	36,886	4,327	4,880	12,985,284	13,587,906	15,908,279	1,716,195	1,798,557	9,099,885
Bahrein	20,006	20,031	2,730	2,734	7,096,141	7,588,554	8,297,998	968,502	1,045,391	1,130,734
Burma	21,576	21,920	2,978	3,017	7,978,969	7,872,981	7,499,498	1,098,184	1,087,424	1,039,960
Canada	26,759	19,894	3,405	2,531	8,718,053	7,837,503	6,965,457	1,109,440	997,487	879,921
Brunei	15,386	15,740	2,052	2,099	5,729,374	5,767,227	5,387,214	764,006	768,320	707,123
Great Germany: Old Reich	12,335	12,393	1,763	1,790	4,543,954	4,487,491	3,850,044	653,590	647,337	552,074
Ostmark	1,933	1,974	288	313	718,494	693,247	370,038	114,045	109,904	63,468
Slovakia and Moravia	311	326	47	49	118,775	119,380	132,005	17,836	18,103	19,282
Poland	10,340	10,691	1,393	1,434	3,891,456	3,898,044	3,828,438	521,984	522,874	504,678
Japan	6,932	7,249	986	1,035	2,638,644	2,652,930	2,511,184	376,657	379,161	356,328
British India	6,070	6,181	838	853	2,249,835	2,332,467	2,330,209	310,596	322,160	322,125
Ecuador	3,993	6,747	526	889	2,349,015	2,312,118	2,257,278	309,686	306,824	319,877
Saudi Arabia	15,480	14,686	2,097	1,989	5,364,610	3,933,904	495,135	726,785	536,366	66,683
Sarawak	3,411	3,622	437	466	1,317,185	1,329,645	1,624,882	168,475	171,322	200,126
Egypt	21,026	14,923	3,002	2,131	6,053,367	4,603,797	1,561,231	864,514	657,570	223,058
Italian Empire: Albania	3,907	3,911	585	583	1,497,124	1,393,727	437,597	224,199	208,279	65,313
Italy	129	185	16	23	57,350	91,330	106,083	7,110	11,346	13,178
France	1,290	1,370	181	192	496,420	500,815	516,240	69,578	70,478	72,106
Hungary	5,881	3,651	791	491	1,755,000	815,248	330,829	236,025	109,896	42,798
Bolivia	343	279	45	32	110,484	100,885	106,620	14,249	11,998	13,262
Other Countries	1,584	1,593	226	227	579,997	578,036	243,000	82,779	82,300	34,080
WORLD TOTAL	5,802,676	5,998,001	793,619	819,607	2,144,463,737	2,076,492,682	1,982,639,390	293,052,840	283,981,456	279,111,097

Detailed monthly reports were published in February, 1941 issue.


High grade gasoline is today one of the most powerful factors of National Defense and, thanks to modern research and equipment, America has more of it than the rest of the world combined.
Wyatt's
WYATT METAL & BOILER WORKS
HOUSTON DALLAS

LORD CADMAN, BRITAIN'S OIL LEADER

DEATH of Lord Cadman of Silverdale which took place on May 31 at his country home, Shenly Park, Bletchley, Buckinghamshire, England, removed one of the foremost figures in the international oil industry and an acknowledged leader in the oil affairs of the British Empire. Lord Cadman had been in ill health since September last when he suffered a nervous breakdown but a fatal termination of his illness had not been anticipated until shortly before the end.

Born at Silverdale, Staffordshire, in the colliery district of England, Sept. 7, 1877, John Cadman was educated at Newcastle under Lyme and at Durham University. His first business post was as manager of the Silverdale Collieries in 1900. Shortly afterward he became agent for Walter Scott, Ltd., at Durham and in 1902 he was appointed Inspector of Mines for East Scotland, later serving in the same capacity for Stafford. In 1904 he was sent as a government mining engineer to Trinidad and in 1907-08 prepared a special report for the Royal Commission on Mines. In 1908 he was appointed professor of mining and petroleum technology at Birmingham University, a post that he did not finally relinquish until 1920 though much of the intervening time was spent in governmental service. In 1920 he received an honorary appointment as professor emeritus at Birmingham University.

During the first world war Prof. Cadman was made a special advisor to the government on petroleum and later was appointed director of the petroleum department of the government. Prior to the war his activities had been almost entirely in the mining field but subsequently he was closely identified with petroleum serving with distinction in the fields of business, diplomacy and scientific investigation so far as these touched upon oil in many parts of the world.

As a representative of the British government he negotiated the celebrated San Remo agreement which gave France a share in the development of Near East oil and he advocated the extension of an interest in this development to American oil companies. More than any other one man he was influential in shaping the form of the Iraq Petroleum Company of which he became chairman upon its formation retaining the position until his death. Meanwhile, through his connection with the government which had acquired a half interest in the Anglo-Persian (now Anglo-Iranian) Oil Company he became actively associated with that company and succeeded to the post of chairman on the retirement of Lord Greenway in 1926. Meanwhile, also his public services had been recognized by a knighthood and it was as Sir John Cadman that he was best known to the oil industry during the most active period of his distinguished career.

A critical period in the affairs of Anglo-Iranian occurred in November, 1932, when the Shah revoked the company's concession in Iran. Journeying to Teheran Sir John conducted personal negotiations with the Shah which led to a new and mutually satisfactory agreement. In the somewhat difficult task of reconciling differences between the different nationalities represented in the Iraq Petroleum Company Sir John's diplomatic abilities often were called into play to the satisfaction of all concerned. In January, 1935, upon the completion of the Iraq pipeline Sir John attended the elaborate ceremonies that marked the formal opening of the line and continued on a tour of the world which took him to India, Australia and thence home by way of the United States. He made several trips to America where he had formed many friendships. In 1932 he delivered the principal address at the annual meeting of the American Petroleum Institute at Houston and he served as British representative at a number of international business conferences.

Lord Cadman of Silverdale.

Although he attained notable success as an administrator Lord Cadman remained a scholar throughout his career and maintained a keen interest in every activity designed to advance scientific knowledge and its application. He was a past president of the Institute of Petroleum, the Institute of Fuel, the Institute of Mining Engineers and the Oil Industries Club, was a member of the board of managers of the Royal Institution and headed a number of governmental commissions dealing with technical industrial problems. In addition to his oil company connections he was a director of the Suez Canal Company and of the Great Western Railway.

Although a prodigious worker who constantly overtaxed his physical resources Lord Cadman was a man of charming personality with a keen interest in his fellow men of whatever walk in life and he was influential in starting many young men on careers of usefulness and distinction. Probably no man in the oil industry had a wider circle of acquaintances or a larger host of friends.

Lord Cadman was married in 1907 to Lilian Harragin of Trinidad. He is survived by his widow and four children, two sons and two daughters. His successor in the peerage is John Basil Cope Cadman, born in 1909. The second son, Denys Cadman, has been engaged for several years past in the service of various American oil companies and is now manager of lubricating oil sales for Imperial Oil, Ltd., of Toronto, Canada, a subsidiary of Standard Oil Co. (N. J.).

Butterfield Road Tanks

are doing very many jobs of national importance, but no job of *greater* importance than the maintenance of the supplies which are the life blood of communications, supplies of petroleum, fuel oil, lubricant, and aviation spirit.

Designed on clean lines and built to give entirely dependable service under rigorous conditions, these robust tankers provide the complete justification of bulk transport as the safest, most economical means of carrying liquid loads, with quick and convenient discharge of contents.

ABOVE: Butterfield Tankers on service in the Near East, where they encounter many bad surfaces and climatic variations. And, RIGHT: an Aircraft Refuelling Vehicle.

HEAD OFFICE:
SHIPLEY, YORKS, England.
Telephone:
Shipley 851 (5 lines).

Butterfields
OF SHIPLEY
Builders of Tanks for 50 Years

Branches:
Belfast, Birmingham, Cardiff, Dublin, Glasgow, Liverpool, Manchester, Newcastle-upon-Tyne, Nottingham.

Foreign Oil Legion

Mrs. D. E. Park and son sailing from New York on May 29 to rejoin Mr. Park of The Texas Company in Caracas, Venezuela.

Mr. & Mrs. E. L. Dodge with David (left) and Dennis arriving in New York from Aruba, D. W. I., where Mr. Dodge is in the chemical division of Lago Oil & Transport's huge refinery.

Above, L. J. Albright of the Standard Oil Company of Venezuela with Mrs. Albright and their daughter Linda who is shown holding a rare white orchid.

Left, Abel Duclous of the Argentine Government Oilfields, Ltd., leaving New York to return to Buenos Aires on June 6.

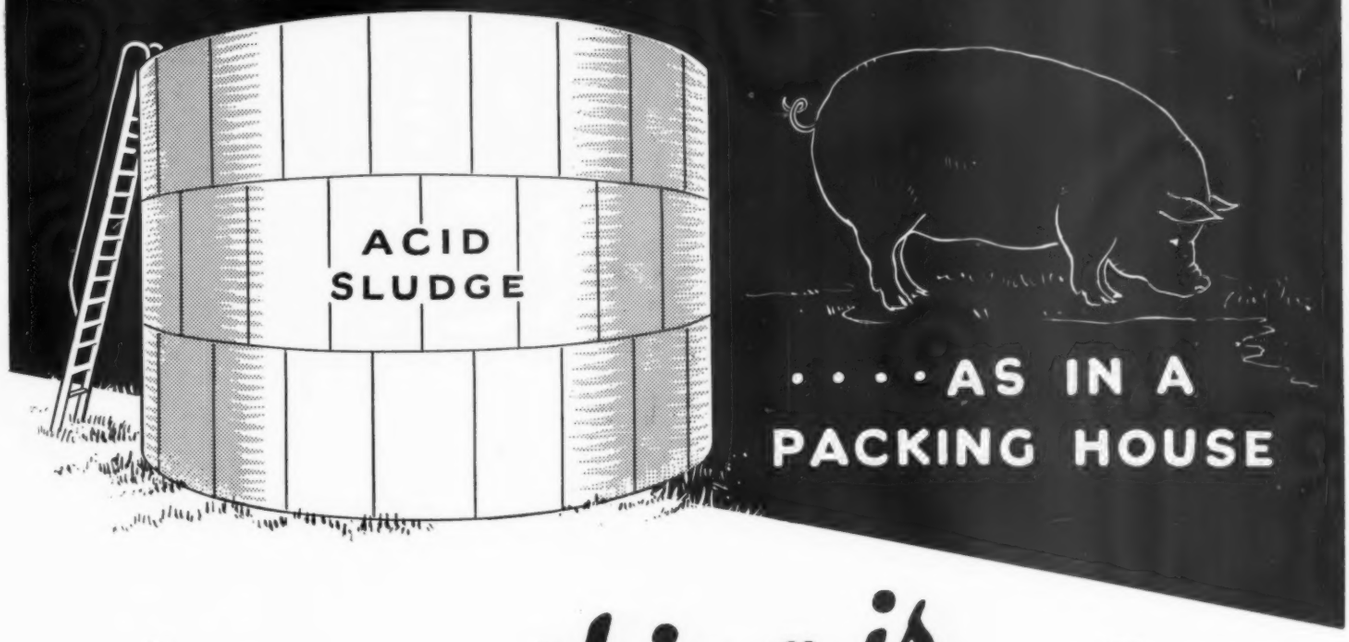
Right center, J. J. Dempsey of the Armor Company en route from New York to northern South America on June 7th on business of his company.

Left (L. to R.), Edward Roberts, sales manager at Lima, Peru; C. S. Wilcox, director; W. F. Prendergast, assistant to the president, all of International Petroleum Company passing through New York on June 2, en route from South America to Toronto.

Right (L. to R.), Mrs. John W. Chambers, Devek, Paul, Mr. Chambers and Roy; Mr. Chambers is director of accounting for Shell in Curacao. He and his family arrived in New York en route to Windsor, Canada, on May 22.

All photographs on this page by Cosmo-Sileo.

IN A CHEMICO SLUDGE CONVERSION PLANT



"Everything is saved"

CHEMICO
CHEMICAL CONSTRUCTION CORP.

Acid Recovery and Production Plants

- *Exclusive Processes and Equipment designed for specific refinery requirements and proven by years of service.*
- *Extensive Research Laboratories, fully equipped for experimentation and origination of processes.*
- *Acid Technologists whose highly successful developments are used all over the world.*
- *A COMPLETE Engineering and Construction Organization with a 27-year record of meeting guarantees.*

The CHEMICO Acid Sludge Conversion Process completely and profitably utilizes all of the sludge. The sulphur value is reclaimed to the highest possible extent, and the process produces 98% or stronger sulphuric acid without regard to the initial strength of the sludge. The only residue is petroleum coke. Part of this coke is used for decomposing the sludge, and the remaining surplus is valuable fuel for use elsewhere. No economic loss enters any part of the process, and no waste of any kind remains.

Each CHEMICO plant is engineered, erected and equipped completely by us, individually adapted to specific refinery conditions, delivered with operatives fully trained, and is backed by definite guarantees of overall performance.

Inquiries are invited without obligation.

CHEMICAL CONSTRUCTION CORPORATION

Main Offices: **30 Rockefeller Plaza, New York**

Cables: Chemiconst, New York

European Representatives: **Cyanamid Products, Ltd., Berkshamsted, Herts., England**

CHEMICO PLANTS are PROFITABLE INVESTMENTS

(C) Cosmo-Sileo

L. M. Ewell (left, above), has been appointed general manager of the eastern division operations of Link Belt Co. He will make his headquarters at Philadelphia. Mr. Ewell is succeeded in his position as export manager by his assistant, C. A. Woerwag (center, above).

H. Shephard (right, above), manager of Anglo-Ecuadorian Oilfields, Ltd., arriving in New York harbor on June 2. He expects to visit Canada and return to Ecuador on July 4.

Impermex

...The New Baroid Product—decreases cake thickness and water loss to a degree never before thought possible

IMPERMEX, a new Baroid Product, has lessened many drilling difficulties.

SALT and SALT WATER contamination in drilling muds is no longer a bar to low water loss and thin filter cake. IMPERMEX lowers water loss in salt muds just as well as in fresh water muds, from over 100 cc. in 30 minutes to less than 10 cc. with an average treatment of only four pounds of IMPERMEX per barrel.

TROUBLESOME SHALE and other caving formations are conquered with IMPERMEX in conjunction with BAROID, because of the combination of high weight and extremely low water loss which IMPERMEX makes possible.

DRILLING-IN is simplified because water losses of less than 8 cc. in 30 minutes can easily be maintained with IMPERMEX regardless of salt, anhydrite, or cement contamination.

IMPERMEX, and all other Baroid Products, help make drilling a *faster, safer* and *more economical* operation!

PATENT LICENSES, unrestricted as to sources of supply of materials but on royalty bases, will be granted to responsible oil companies and operators to practice the inventions of any and/or all of United States Patents Nos. 1,575,944; 1,575,945; 1,807,082 and 1,991,637 and further improvements thereof. Applications for such licenses should be made to the Los Angeles office.

BAROID PRODUCTS

BAROID and COLOX—Drilling Mud Weighting Materials.
AQUAGEL—Gel-Forming Colloidal Drilling Clay.
FIBROTEX—For Regaining or Preventing the Loss of Circulation.
BAROCO—A Salt-Water-Resisting Drilling Clay.
STABILITE—A Chemical Mud Thinner.
AQUAGEL-CEMENT—For Recovering Lost Circulation and Cementing Casing.
SMENTOX—For Counteracting the Effects of Cement Contamination and for Reconditioning Cement-Cut Mud.
ZEOGEL—Used as a Suspending Agent When High Concentrations of Salt or Salt Water Are Encountered.
IMPERMEX — A Concentrated Colloidal Additive Agent for Reducing Water Loss in Salt-Laden Muds.
MICATEX—For Reducing Water Loss to the Formation and for Overcoming Mild Cases of Lost Circulation.
TESTING EQUIPMENT—For Drilling Mud Analysis and Control.
BAROID WELL LOGGING SERVICE — Formation Information Thru Mud Analysis.

BAROID SALES DIVISION
National Lead Company

Baroid Products and Service Engineers are available in all active oil fields in the U.S.A.

BAROID SALES OFFICES: HOUSTON • LOS ANGELES • TULSA

(Patented)

STOP that waste of

Time, Toil, Temper and PROFITS

with Acme's New "Wonder-Tool"—the

MUD COLLAR

Not what it IS but what it DOES for the Rotary Driller is the "pay-off." It's really *sensational* — the savings it shows. Yes! It does more than promised.

In *Sticky Formations:* Acme's Mud Collar prevents bits "balling up" and "mud rings" forming.

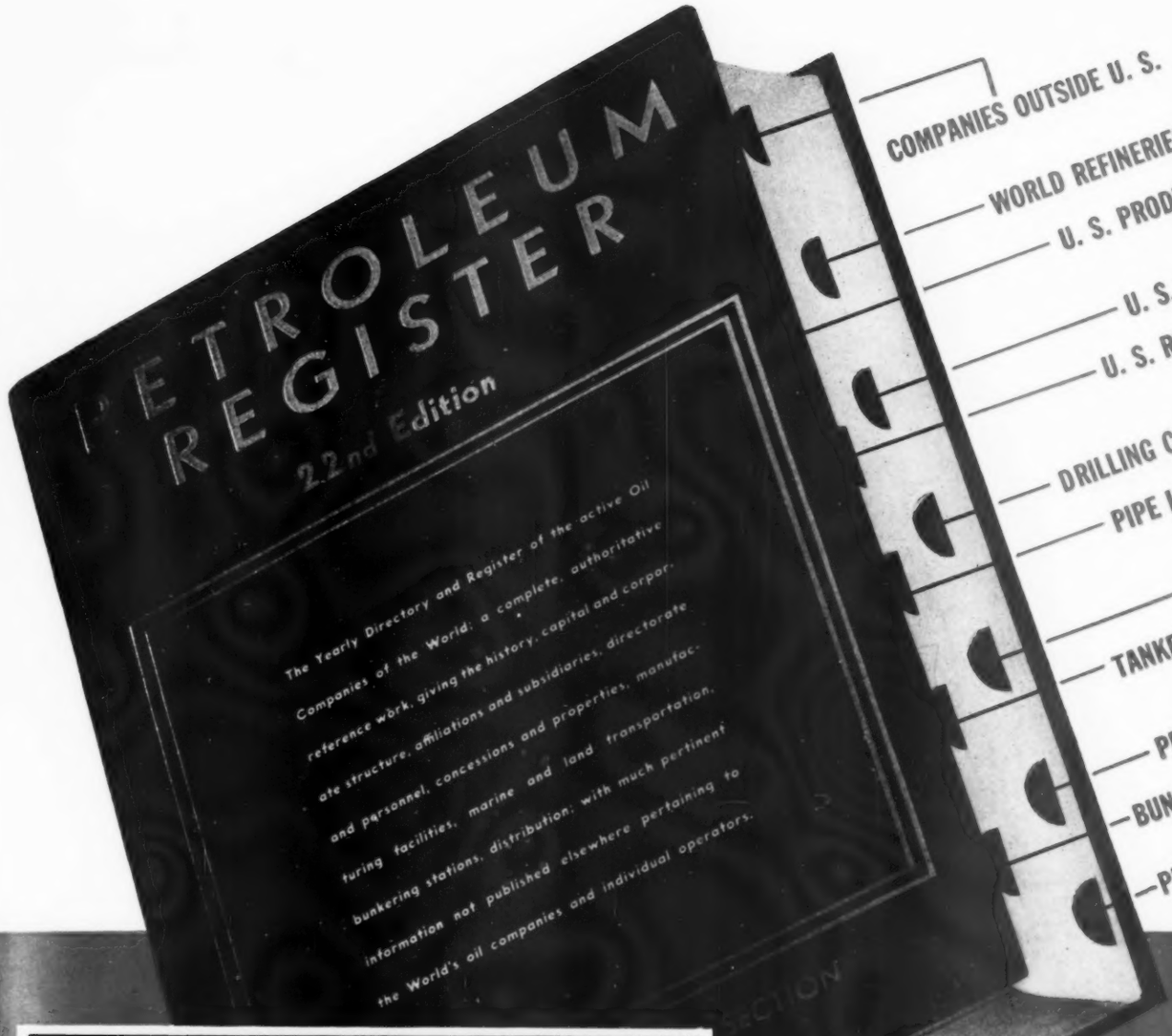
In Any Formation: It assures faster cutting, longer runs, fewer "green" bits, better hole and less drill pipe torque. 6 Hi-velocity fluid streams keep cutters clean . . . wash cuttings off bottom . . . make cutting faster and freer. Also lubricate and keep fresh cuttings out of bit bearings.

Order through your Supply Store. If not in stock, write and let us tell you ALL about this Modern Marvel Tool.

Get Full Particulars—TODAY!

Acme Fishing Tool Co.
Parkersburg W. Va.
Export Office:
19 Rector St.
N. Y. City
U. S. A.

"The World's Standard of Quality Since 1900"


PETROLEUM REGISTER
22nd Edition
The Yearly Directory and Register of the active Oil Companies of the World; a complete, authoritative reference work, giving the history, capital and corporate structure, affiliations and subsidiaries, directorate and personnel, concessions and properties, manufacturing facilities, marine and land transportation, bunkering stations, distribution; with much pertinent information not published elsewhere pertaining to the World's oil companies and individual operators.
COMPANIES OUTSIDE U. S.
WORLD REFINERIES
U. S. PRODUCERS
U. S. MARKETERS
U. S. REFINERS
DRILLING CONTRACTORS
PIPE LINES
BRANDS
TANKERS
PROF. DIRECTORY
BUNKERING
PROD. PERSONNEL

HERE JULY 29TH

The 1941 PETROLEUM REGISTER, up-to-date with all the information and data on every oil company throughout the world; — properties, operations, subsidiary and associate companies; financial and corporate statements, managing personnel, etc.;—everything one wants in a Register of the Petroleum Industry.

Here's my order

PETROLEUM REGISTER • 2 WEST 45th STREET • NEW YORK CITY

Enter my order for a copy of the New 1941 PETROLEUM REGISTER for which I enclose $10 in full payment.

Name _____ *title* _____

Company _____

Address _____

Jim Thomas, president of the New York Chapter.

NOMADS Hold 1941 Golf Party

I. Frank Brown, with trophy awarded for low gross score.

L. to R. Joe Behr, Jerry Wharton, Ole Olson, winner of one of the handicap prizes, and Fred Herrschaft.

L. to R. John Baird, Val Wittich, another winner of the kicker prizes, John Hicklin and Bill Campbell.

New York Chapter of Nomads held a golf tournament at Okland Country Club, Long Island, on June 11. I. Frank Brown won the attractive trophy shown above with a low gross score of 79. After dinner, Talbot Simpson, Standard-Vacuum, gave a talk on conditions in the Far East. Photographs on this and the facing page, taken by Jim Thomas, show some of the members and guests attending the outing.

GEOPHYSICS

Volume VI, Number 2

(April, 1941)

Application of the Fourier Integral to Some Geophysical Instrument Problems — *W. T. Born and J. M. Kendall*

The Effect of the Placement of a Seismometer on its Response Characteristics — *Harold Washburn and Harold Wiley*

The Attenuation Constant of Earth Materials — *W. T. Born*

The Range of Amplitudes in Seismic Reflection Records — *J. M. Kendall*

Average Vertical Velocities from Refraction and Reflection Profiles — *W. R. Ransone and Frederick Romberg*

Network Adjustment by Least Squares—Alternative Formulation and Solution by Iteration — *M. O. Gibson*

The Calculation of Gravity Anomalies due to Bodies of Finite Extent — *S. Levine*

An index of past Society publications may be obtained by addressing

THE SOCIETY OF EXPLORATION GEOPHYSICISTS

P. O. BOX 777 **AUSTIN, TEX.**

40-RANGE Universal AVOMETER

Regd. Trade Mark

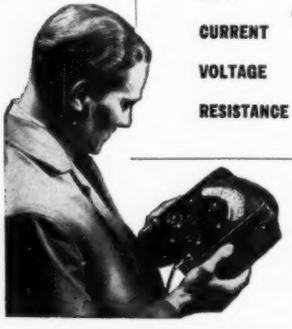
ELECTRICAL MEASURING INSTRUMENT

A SELF-CONTAINED combination A.C./D.C. meter of B.S 1st Grade accuracy, the Model 40 Universal Avo-Meter provides for an exceptionally wide range of measurements. Every essential electrical test on the bench, or out on a job can be carried out simply, speedily and with unfailing accuracy. An automatic protective cut-out is incorporated in place of the conventional replaceable fuse.

ONE INSTRUMENT measures:—

CURRENT	A.C. 6m/A. to 12 amps. (in 8 ranges); D.C. 6m/A. to 12 amps (in 8 ranges).
VOLTAGE	A.C. 6 volts to 1,200 volts (in 8 ranges); D.C. 60m/V to 1,200 volts (in 12 ranges).
RESISTANCE	0 to 1 megohm (in 4 ranges), reading down to 0.1 ohm.

BRITISH MADE



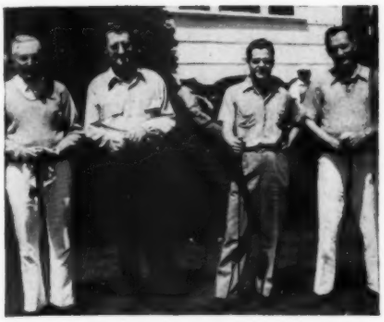
In spite of greatly increased production, most of our output of "AVO" Instruments is being taken by the Services. Delay in delivery of Trade Orders is consequently inevitable, but we shall continue to do our best to fulfill your requirements as promptly as possible.

Write for fully descriptive literature and current prices.

Sole Proprietors and Manufacturers:—

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.

Winder House, Douglas Street, London, S.W.1. England. *Phone: VICtoria 3404-7*



L. to R. Harry Angel, Jim Reed, Paul Van Wirt, and Ralph Cruickshank.

L. to R. Walter Fellows, handicap winner, Ed Landgraff, Sam Gallay, W. D. Robinson, H. Maland, handicap winner, and George Eichler.

Indoor foursome: L. to R. Ted Carter, Harry Potts, Roger Motheral, and Bud Bishop.

L. to R. Howard Slater, I. Frank Brown, Wm. Laseter, Guy Daniels, the serious golfers.

L. to R. M. A. Huffman, K. D. Brandenburg, George Flanagan, and A. V. Simpson actually on the links.

L. to R. Russ Heath, T. Simpson, Ed Racek, and Bob Ingalls.

L. to R. Richard McPeake, E. M. Gretzler, Bill Foster and Bill Siems.

"Right the first time ...and right on time!"

It's a 49-year tradition here at Sharon to deliver each order on schedule and exactly as specified. You can place your steel fabricating jobs with us in complete confidence. The resources of General American Transportation Corporation, joined with the steel skill of the veteran personnel taken over intact from P. I. W., assure unsurpassed service on pressure vessels, storage tanks, and other riveted or welded steel equipment.

GATX GENERAL AMERICAN PLATE & WELDING DIVISION PLANT AT SHARON, PA.

"FLUID FUSION" WELDED VESSELS are now made EXCLUSIVELY by

PLATE AND WELDING DIVISION
GENERAL AMERICAN TRANSPORTATION CORP.
Successor to Plate & Welding Div., Petroleum Iron Works Co. (P. I. W.)

Plant at Sharon, Pa.
Offices in All Principal Cities

The WIPER WITH THE TRAP-DOOR LOCK

— equipped with Safety Cap

Compact

Floating Rubber Refills

Equipped with double seal wiper consisting of two freely floating, self-aligning, reinforced discs of tough, wear-resisting rubber. Pump as well as rod can be pulled through. The Safety Cap shuts like a trap-door and holds the rods. See Composite Catalog.

PATTERSON-BALLAGH CORPORATION
Los Angeles Houston New York City

PATTERSON-BALLAGH
UNIVERSAL TYPE
SUCKER ROD WIPER

WORLD PETROLEUM ABSTRACTS

Summaries of the Most Important Articles as Published in the Oil Press of the World Dealing with Technical and Economic Aspects of the Petroleum Industry — Edited by Dr. O. W. Willcox.

GEOLOGY

Aspects of Fluorescence Analysis in Petroleum —Jack De Ment, in OIL WEEKLY, Vol. 10 (1941), No. 2, pp. 16-18, 20-22.

Attention is called to the significant but not very well known use of fluorescence in correlating oil sands, which is said to have served as a sure and fool-proof method of correlating oil sands in certain of the oil fields of California. It is even supposed that this method may well supplant the study of micro fossils and mineral grains in correlating these sands.

The method is based on the fact that all petroleums fluoresce intensely when radiated with ultraviolet rays with wave lengths of 2,000 to 3,800 Angstrom units. So far as known, no two specimens show the same quality and degree of fluorescence unless they have been obtained from identical sands. Neither the specific gravity of the oil nor the presence of mud and water in the sample will mask the characteristic fluorescence peculiar to that oil. This provides an index for each oil formation, which may well serve to distinguish it from all others.

Formation Samples From Gun Perforations —J. T. Richards in Bulletin AMERICAN ASSOCIATION PETROLEUM GEOLOGISTS, Vol. 25 (1941), No. 4, pp. 752-579.

Gun perforators have come into considerable use in petroleum development work for two general purposes; to explore possible producing formations which were cased off during the drilling of old wells, and for perforating casing opposite recently drilled formations for a more efficient production of oil or gas from those formations.

The author has hit upon a method which seems to indicate which perforations had been effective and which had not. It has been observed that the combustion chambers of the spent shells very often contained rock material and it has even been found that the bullet projected from the shell had returned to the shell after firing. The author explains this circumstance as follows:

First, on penetrating the formation, the bullet displaces by compression, consolidation and brecciation the material occupying the space in its path.

1. This loosened material exists in the form of rock dust and rock fragments.

2. Due to the velocity of the bullet and the vacuum immediately behind a traveling projectile, some of the loosened rock material is drawn into the space opened by the bullet. Possibly gravity pulls some fragments into the space.

4. The loosened rock material is suspended briefly in the gases propelling the bullet.

5. The propelling gases contract immediately after full expansion, generating a suction from the formation to the shell.

6. Since this suction is strong enough to carry bullets from the formation back into the shell, it is also strong enough to carry loosened, shattered rock fragments into the shell.

The rock fragments thus ensconced in the empty shell come to the surface with the gun and it requires only a simple technique to recover them for microscopic examination. The information they furnish may have wide and varied uses. The author could find no record of anyone having thought of studying this material.

DRILLING

Pressure Core Analysis— J. J. Mullane, before AMERICAN PETROLEUM INSTITUTE, 11th Mid-Year Meeting, Tulsa, May, 1941.

This paper presents a summary of results obtained with the Carter pressure core barrel. It is shown that a more complete analysis of the core now can be obtained, and that the usefulness of core analysis has been considerably extended. Reliable gas-oil-ratio data have been obtained. These data can be considered as an index of the energy available in the oil for production. Thus, it is known immediately whether a formation cored with the pressure core barrel is "alive," or whether it merely contains dead oil or oil under very low pressure. It has been found that gas reservoirs can be cored successfully. This fact is of the utmost importance when it is desired to obtain core data in a distillate reservoir. The residual oil saturation in cores taken from distillate wells will average about 2 per cent of the pore volume. Thus, with a conventional core barrel, the major portion of the hydrocarbon content of the core is irretrievably lost. Another advantage of pressure core data that is observed is found in coring certain lime formations. In many cases, the properties of the formation are so lacking in uniformity that it is very difficult to make a detailed sample analysis. With the pressure core barrel it is possible to obtain an overall index of the properties of a well through the medium of the gas data and volume of oil produced from the core when the pressure in the barrel is relieved. The detailed

LEACH EXCHANGERS
for
High Temperatures
High Pressures

Fracto Control

High Heat Transfer
Low Vapor Pressure Drop
Long Tube Life
Easy Cleanability

Leach Exchangers are fully protected by U. S. and foreign patents

C. H. LEACH CO.
117 Liberty St. New York

RENOLD
MARK 3
OIL WELL CHAIN

Designed and made to A. P. I. specification by the world's leading driving chain makers.
Send for leaflet No. 216/32
THE RENOLD & COVENTRY CHAIN CO. Ltd. MANCHESTER, ENGLAND
Agents throughout the world

First commercial unit just completed!

ISOMERIZATION

An ample supply of isobutane is essential for the alkylation process of manufacturing high octane aviation gasoline.

Isomerization will produce it.

1. Isobutane for charging to alkylation units is readily produced from normal butane. Nearly all of the normal butane charged can be converted to isobutane with a high conversion per pass.

2. The process is simple, involves inexpensive equipment, operates at moderate temperatures and pressures throughout.

3. Isomerization makes the alkylation process immediately available to the petroleum industry in cases where the ordinary supply of isobutane is insufficient or too expensive.

Under patents of the Shell Development Company.

FOSTER WHEELER CORPORATION
165 Broadway
New York, N. Y.

FOSTER WHEELER

ATLANTIC'S *great tanker fleet grows*

WHEN the big new tanker, the *S. S. E. H. Blum* (shown below), recently slid down the ways, the great fleet of The Atlantic Refining Company had grown to 24 vessels, with a total tonnage of 281,779.

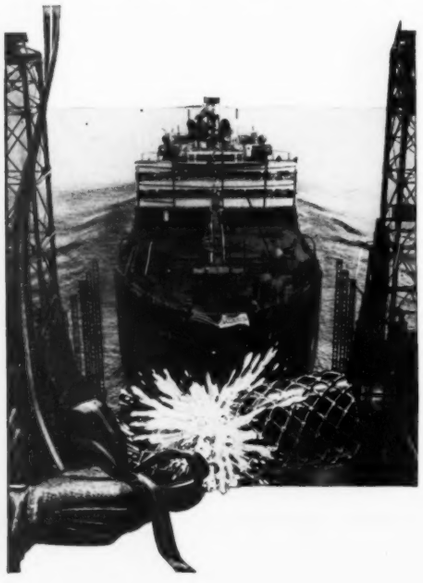
This new ship is typical of the modern vessels being added to the growing Atlantic Refining fleet. She is a 19,400-ton oil carrier, with a cargo capacity of 154,000 barrels, and a sea speed of 13.25 knots.

Atlantic today operates the largest all-welded tankers in the world, a design which this company pioneered. Atlantic has also led in the development of the Diesel-electric drive, and it now has more ships so equipped than any other fleet.

The size, speed and efficiency of the great Atlantic fleet make it possible for Atlantic products to serve far-flung markets. Atlantic products distributed in South America include Atlantic Gasoline, Atlantic Motor Oils and Atlantic Lubricants, for automobiles and marine engines and industrial uses.

THE ATLANTIC REFINING COMPANY

PHILADELPHIA, PENNSYLVANIA, U.S.A.



sample analysis then can be used as auxiliary data to aid in making a good estimate of the properties of the formation which would be of considerable interest.

An individual account has been given for each quantity of interest in a pressure core analysis. It is shown that more detailed information is now available on each quantity of the analysis and, further, that some knowledge of the process by which a core arrives in its final state has been obtained.

PIPELINES

Laboratory Tests of Cathodic Protection in Soils —W. Ryland Hill, in PETROLEUM ENGINEER, Vol. 12 (1941), No. 6, pp. 69; 72; 79; 76.

At present there is considerable controversy concerning the electrical conditions required for effective cathodic protection. Many have stated that it is necessary to establish a certain voltage difference between the metal and the adjacent soil; others have suggested that establishing a given current density at the metal surface is more important. These statements in some cases have been based on theoretical considerations, and in other cases on the results of field or laboratory tests of limited scope.

In order to obtain more complete data on the behavior of cathodic protection, a series of laboratory experiments was made under carefully controlled conditions on nearly 300 steel samples tested both in solutions and soils.

The choice of a criterion for measuring the effectiveness of a cathodic protection installation is complicated by the fact that both the current density and the metal-to-soil potential required for protection are affected by the soil conditions. A study of the data, however, shows that high-resistance soil required a low current density for protection and that low-resistance soil required a high current density. This is a fortunate circumstance because an electrically protected pipe line passing through soil that varies in resistivity from place to place tends to collect more current in the low-resistance areas than it does in the high-resistance soil. A method of pipe-line testing is based on this relationship between the soil resistivity and the current density needed for protection.

Prevention of Corrosion of Steel Pipe Lines by Oil Well Brines—William Streicker, before AMERICAN PETROLEUM INSTITUTE, Southwest Division of Production, Shreveport, February, 1941.

A steel pipeline in a brine-disposal system was found to be corroding badly. The main line consisted of about 4½ miles of 8-in. pipe into which brine from the oil field was delivered through more than 5 miles of 6-in. feeder pipe. It was suggested that sodium silicate might provide a protective coating on the inside of the pipe. After some experimentation the following procedure was adopted: 100 gallons of silicate of soda containing 8.9 per cent of Na_2O and 28.7 per cent of SiO_2 is diluted with 10 times its volume of water and this dilute solution is sufficient to treat 1,000,000 gallons of salt water. The method of feeding is to add the silicate solution by means of needle valves on the suction side of the centrifugal pumps used to pump the brine. When thus diluted in the brine the concentration of the silicate of soda is about 40 parts per million. It is necessary to dilute the silicate before injecting it into the line, otherwise a precipitate will be formed.

The results of the trial appear to be fairly satisfactory. In 29 months preceding the use of silicate

Today's OIL NEWS TODAY

Responsible oil men depend on Ira Rinehart's Oil Reports for "Hot" daily information on drilling wells, production, pipe line, statistical and political news in the mid continent and gulf coastal regions.

Daily reports issued except holidays and Sundays in special mimeographed form. Maps of all "hot" areas given and all the news of the southwest thoroughly covered and analyzed by a highly trained and specialized group of experts and staff men stationed at every important oil city.

Texas - Arkansas - Louisiana - New Mexico reports published at Fort Worth and Houston. Oklahoma - Kansas reports published at Tulsa. We respectfully solicit your inquiries at any of our publishing offices.

★ ★

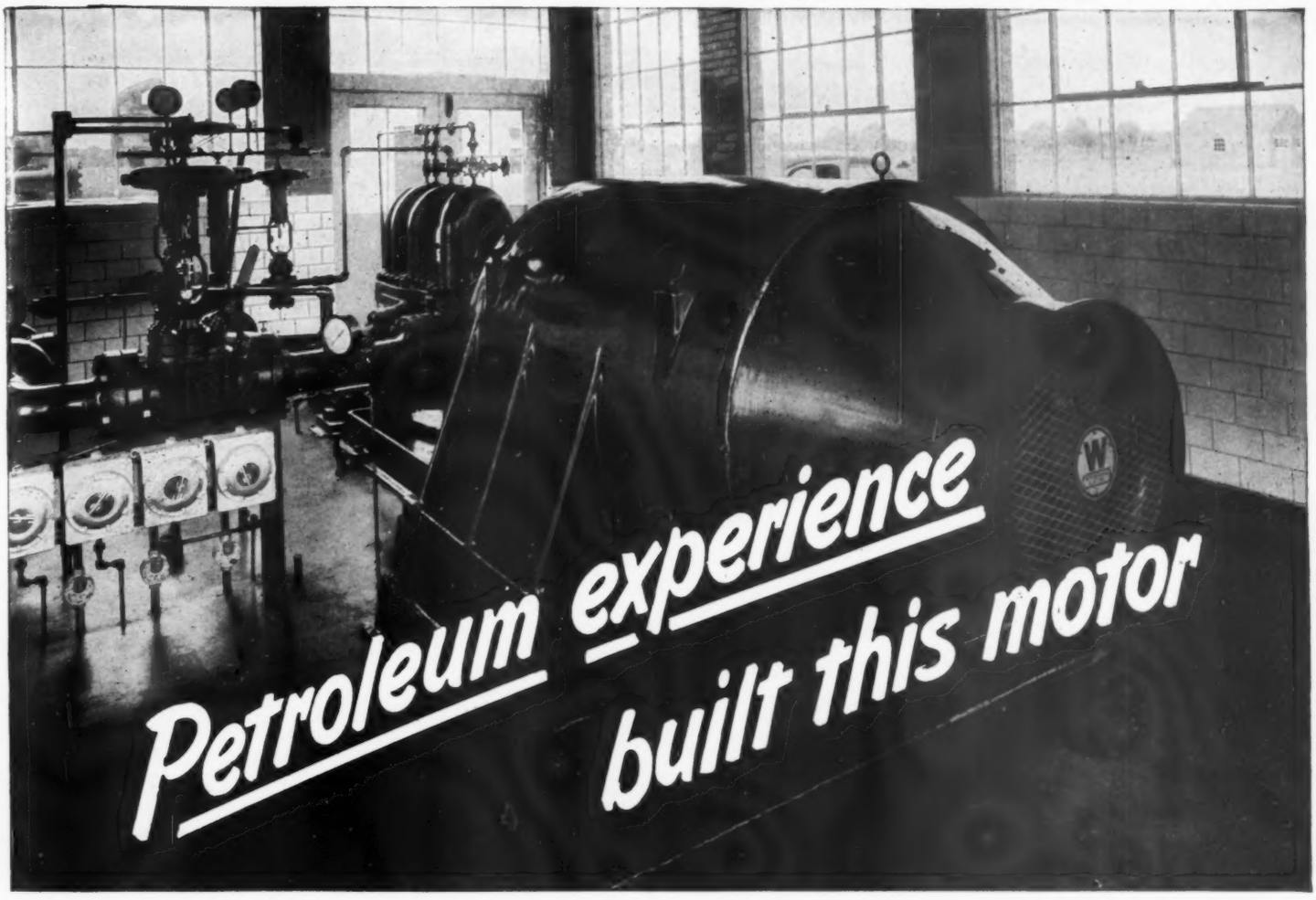
Ira Rinehart's
OIL REPORT
PRIVATE & CONFIDENTIAL

HOUSTON, TEXAS
2420 Gulf Building
Phone: C-1385

TULSA, OKLAHOMA
606 Daniel Building
Phone: 4-4138

FORT WORTH, TEXAS
704 Fair Building
Phone: 2-5314

ESTABLISHED IN 1924



AND NOW IT'S "STANDARD" WHERE HIGH CAPACITIES ARE REQUIRED FOR PUMPS IN HAZARDOUS LOCATIONS

THEIR EXPERIENCE WORKS FOR YOU

For more than 50 years, Westinghouse engineers have worked side by side with every branch of the petroleum industry, to develop electrical equipment to meet your specific requirements. Take advantage of this experience and ability on your next electrical problem.

This Westinghouse explosion-resisting motor for refinery and pipe line service was the first large motor for "Hazardous Locations" to be built without the use of forced ventilation or external cooling equipment. Instead, it employs the long-proved dual ventilated frame originally developed by Westinghouse.

The design met the industry's needs so completely that it has now become "standard"—proved by the purchase of more Westinghouse motors of this type than those of all other manufacturers combined. It is available in ratings up to 1000 hp, 3600 rpm.

More than *electrical* ability was required to design these motors. Our engineers constantly study the petroleum industry and its needs. They appreciate the jobs that motors do—and what breakdowns can cost. So, they build electrical equipment in the light of this practical experience.

That's why it always pays to talk with your local Westinghouse representative when you have an electrical problem. You get "high test" ability that is ready to go to work for you. Try it, for your next electrical need.

WESTINGHOUSE ELECTRIC INTERNATIONAL CO.
40 WALL STREET, NEW YORK, N. Y., U.S.A.

J-94383

Westinghouse

ELECTRICAL PARTNER OF THE PETROLEUM INDUSTRY

W
WESTINGHOUSE ELECTRIC

there were 218 leaks in the line that required repairing; in the 30 following months there were only 109 leaks due to internal corrosion. The number of leaks was thus reduced by half. This seems to be still a large number of leaks but there is a substantial gain in avoiding the expense of installng a new line, and a reduction in the cost of repairs.

The protective action seems to be due to the formation of a protective film on the interior of the metal.

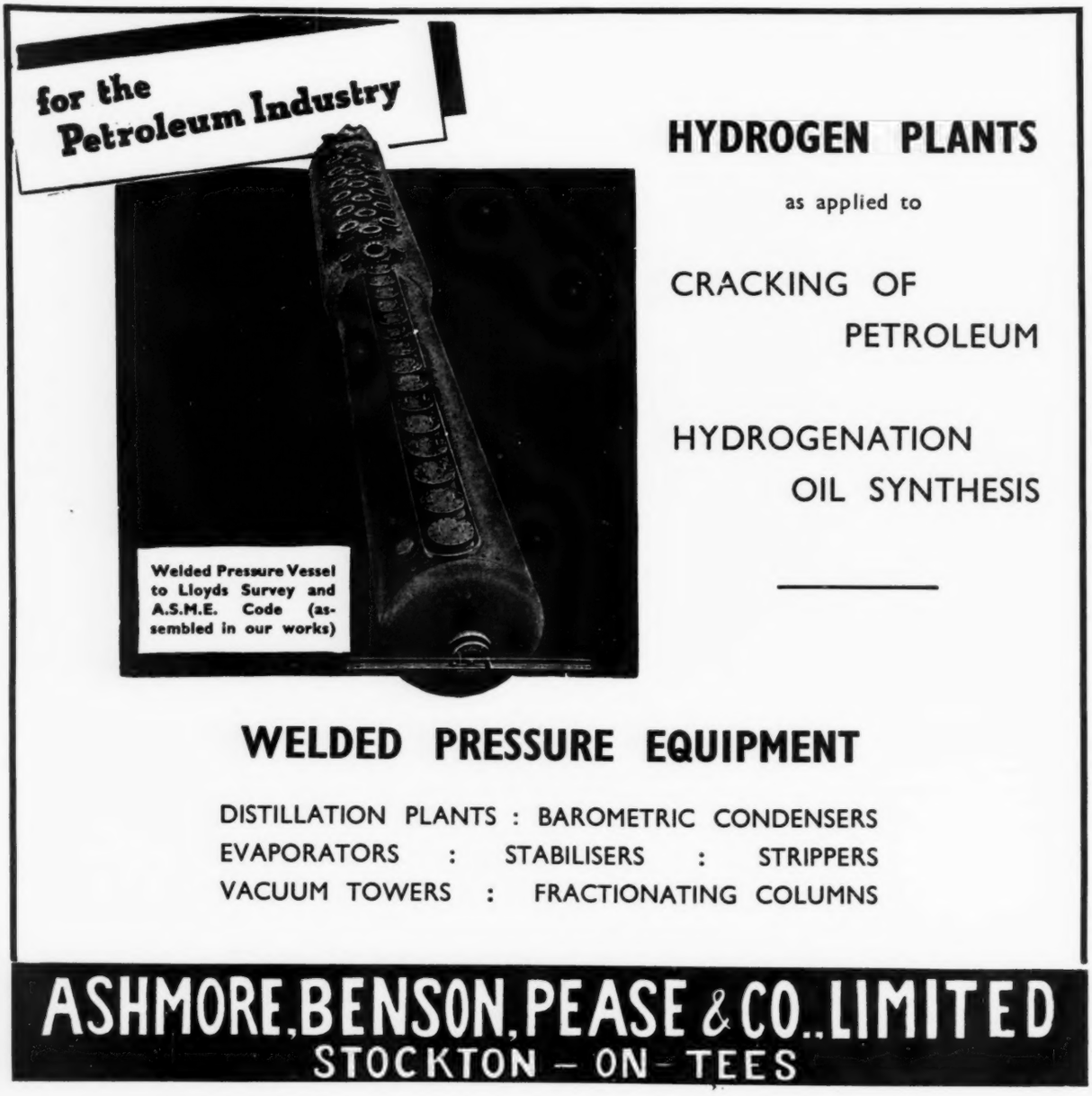
REFINING

Working Methods Applied to Primary Products of the Synthetic Process and Their Application to Natural Petroleum—H. Velde in OIL AND KOHLE, vol. 37 (1941) No. 9, pp. 143-148.

This paper is a discussion of new methods which the German oil technologists have used to obtain high-octane motor fuel and lubricating oils from synthetic petroleum derived from coal. For reasons not hard to understand details are not given. In essence, it amounts to a new catalyctic process which is applied to the C_5-C_{11} fraction obtained from the primary product of the synthesizing process. Formerly this fraction was treated by the thermal cracking processes that were developed in the natural petroleum industry. However, thermal cracking or reforming of this artificial gasoline is disadvantageous for two reasons: the rise in octane number is small, and there is a large cracking loss of material that has been produced at a high cost to begin with. In the new process the primary synthetic gasoline is stabilized and passed in vapor phase to a catalyst chamber (catalyst not described); on issuing from this chamber the vapors are cooled somewhat and passed through a second chamber filled with the same kind of catalyst. Fractionation to remove a small amount of polymerisate yields a gasoline with octane number around 72 or higher, depending on the content of olefins plus aromatics (56 to 83 per cent in the original material). Losses in this process are not specified, but it seems to be implied that they are quite small. No regeneration of the catalyst is necessary except a steam treatment to blow out polymerisate.

In this catalystic process there is very little change in the olefin content, and only a slight increase in the content of aromatics. The increase in octane number seems to be due mainly to a shift of the double bond from the ends of the molecules toward the middle. The proportion of double bonds that are thus shifted is so definite that it is possible to predict the octane number of the "reformed" product from the olefin content of the charging stock. Subsequent hydrogenation of the raffinate distinctly depreciates its octane number. It is not stated whether the gasoline is gum-proof.

The author states that this process also has very distinct advantages in treating thermally cracked natural petroleum products that are rich in olefins. (No doubt details will be available after the war, Editor.)


for the Petroleum Industry
Welded Pressure Vessel to Lloyds Survey and A.S.M.E. Code (assembled in our works)
HYDROGEN PLANTS
as applied to
CRACKING OF PETROLEUM
HYDROGENATION
OIL SYNTHESIS
WELDED PRESSURE EQUIPMENT
DISTILLATION PLANTS : BAROMETRIC CONDENSERS
EVAPORATORS : STABILISERS : STRIPPERS
VACUUM TOWERS : FRACTIONATING COLUMNS
ASHMORE, BENSON, PEASE & CO., LIMITED
STOCKTON – ON – TEES